XMPDISPLAY CO., LTD

XNB-46S

Super Narrow Bezel Multi-Vision LCD Monitor

PRODUCT INTRODUCTION

Revision 1.2
Nov 2009

XMPDisplay Co., Ltd.

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RoHS
Compliant
2002/95/EC

Note : The specification is subject to change without prior notice.

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Thank you for purchasing our Super Narrow Bezel LCD Monitor ”XNB-46S”

This manual describes how to use the product and notes in use.
Please read the manual carefully before using it.
After reading the manual, keep it with the certificate for you to refer to it whenever you need.
If you have any question or any problem occurs, please contact to the provider or the A/S center immediately.

※Pausing static picture for around 3 hours may cause an afterimage effect.

⚠ **Warning** If you fail to comply with the regulations for safely and proper use, fire or injury may be caused.

Notice of users

Class A digital device

It is a device designed for business purpose with a safety certificate for electromagnetic interference, which user should be mindful of.

List of Parts

VGA Cable

DVI Cable

Power Cable

RS-232 Cable

Stand Unit (Option)

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1. General Description

General Description

This document is the specification of 46” TFT-LCD MULTI VISION MONITOR for application of DID, which is based by SAMSUNG LTI460AA04, the first Ultra Narrow Bezel LCD Product world wide.
XNB-46S is a High quality TFT-LCD multi vision solution for display device having RoHS.

General Features

- Resolution : WXGA (1366 * 768 @ 60Hz) Recommend
  PC(VGA)/DVI : 1920 * 1080 @ 60Hz(Input only) at Multi
  COMPONENT : 1080p(Input only) at Multi
- Image Screen Input Signal: PC(VGA) / DVI / COMPONENT / SVHS / CVBS
- ROHS Compliance
- Supports VESA DDC 2B
- Support RS-232 Data transmission
- On Screen display(OSD)

Electrical Specification

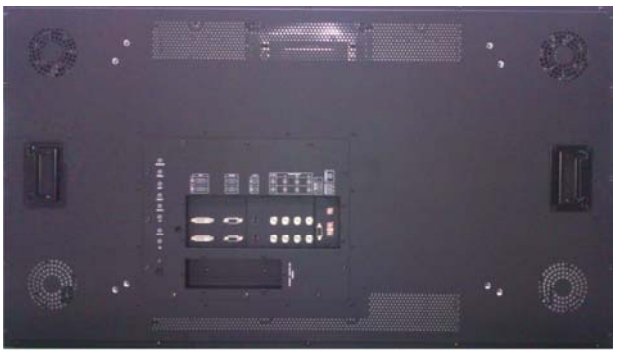
Input Power **:** Input power is required as below
Voltage : Universal Voltage [90Vac – 264Vac / 47Hz – 63Hz]
Consumption : 300 [W] (Max)

Power Management

Mode	V-Sync	H-Sync	Video	Power Consumption
ON	Pulse	Pulse	Active	Less than 300 [W]
Off (Stand by)	-	-	Blank	Less than 5 [W]

< Top View >

< Front View >



< Back View >

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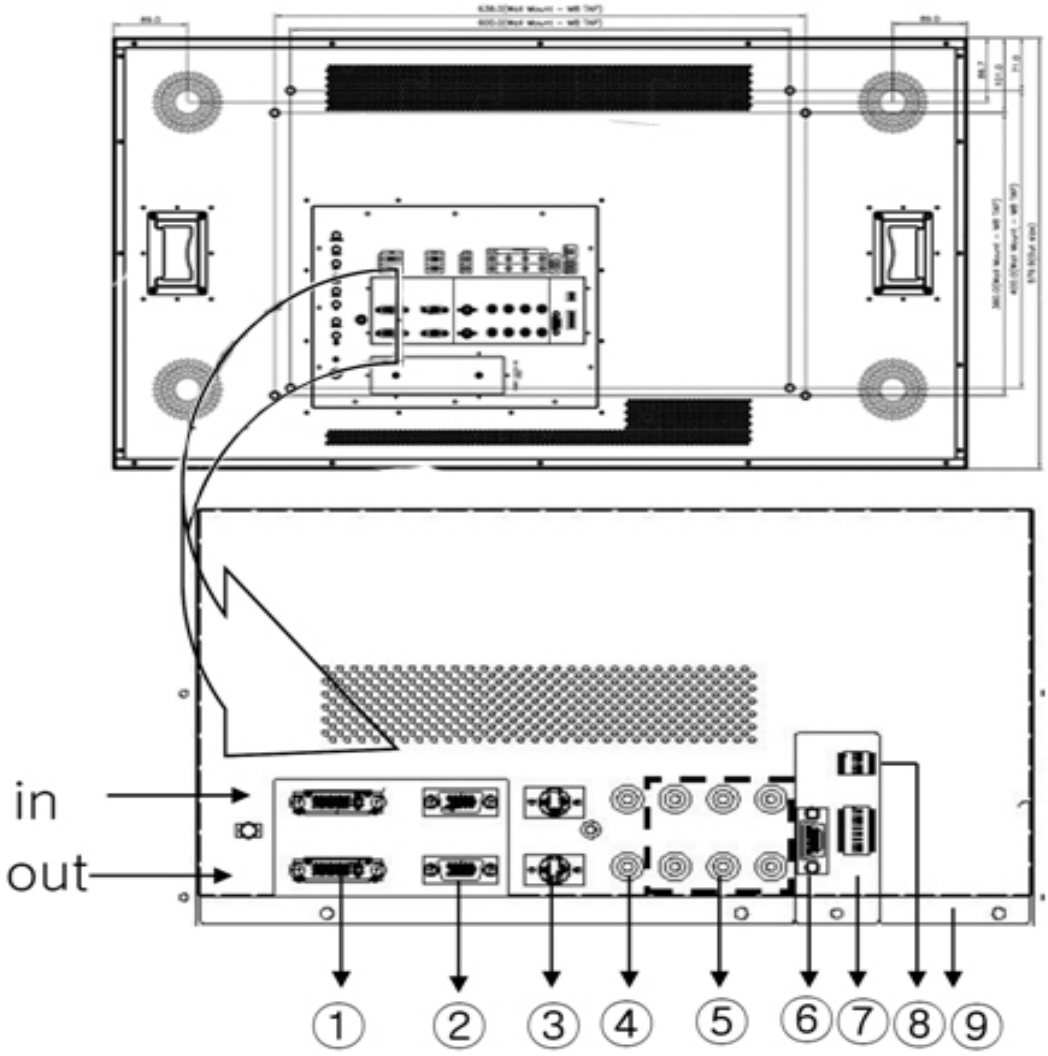
2. Data Sheet

2.1. Input, Output Terminals



① . DVI IN / OUT
- Computer digital video signal in/output.

② . D-SUB IN / OUT
- Computer analog (R,G,B) signal in/output.

③ . S-VIDEO IN / OUT
- Super video (Y/C) signal in/output.

④ . CVBS IN / OUT
- Composite video signal in/output.

⑤ . COMPONENT IN / OUT
- Component (y, Pb, Pr) signal in/output.

⑥ . RS-232 (C0ntrol)
- External communication input.

⑦ . DIP Switch
- Monitor ID & I²C/RS-232 switch setting.

⑧ . AC INPUT / OUTPUT

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2.2. XNB-46S System Data sheet

Item				Specification
LCD Module	Model Name			XNB-46S
	Pixel Pitch			0.7455(H)x0.7455(V) [mm]
	Active Display Area			1018.353(H) x 572.544(V) [mm]
	Resolution			WXGA 1366 x 768 pixels (16:9)
	Colors			16,777,216 (8 bit)
	Luminance of white			500cd/m^2 (Typ,) 700cd/m^2 (Max)
	Contrast Ratio			3,000:1 (Typ)
	Viewing Angel			U/D/L/R = 89º
	Response Time			8ms (GTG)
	Bezel			Super narrow bezel
Pixel Clock				25.2MHz-165MHz
Power Management				None
Plug and Play				Yes / DDC2B
Control				IR(Remote Control) , OSD Key(8 keys), RS-232(DSUB 9 Pin)
Speaker / Audio Output				None
Input / Output Signal	Horizontal Range			30.0 – 68.0 KHz
	Vertical Range			50 +/- 1Hz, 60Hz +/- 1Hz
	Pixel Clock			25.2MHz-165MHz
	VGA / DVI		Connector	DSUB-15P IN/OUT , DVI-D IN/OUT
			Sync	Separate
			Resolution	640x480-60,800x600-60,1024x768-60,1280x1024-60, 1366x768-60,1366x768-50,1368x768-60,1368x768-50, 720p-60,1080p-60, 720p-50,1080p-50
	Component		Connector	BNC IN/OUT
			Resolution	480i,480p,720p-60,1080i-60,1080p-60, 576i,576p,720p-50,1080i-50,1080p-50
	S-Video		Connector	S-Terminal IN/OUT
			Color System	NTSC / PAL
	CVBS		Connector	BNC IN/OUT
			Color System	NTSC / PAL
Control Signal				DSUB 9 Pin IN / OUT(Through DVI cable) For RS-232 Control
Power Supply				Universal 300W(Max) (100-240)
Current Rating				2.73A @110V , 1.36A @220V
Operation Environment (*1)		Temperature		5 ~ 40 ºC
		Humidity		20 – 80% (without condensation)
Storage Environment(*1)		Temperature		-20 ~ 60 ºC
		Humidity		10 – 90% (without condensation)

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Note 1) Temperature and Relative humidity range

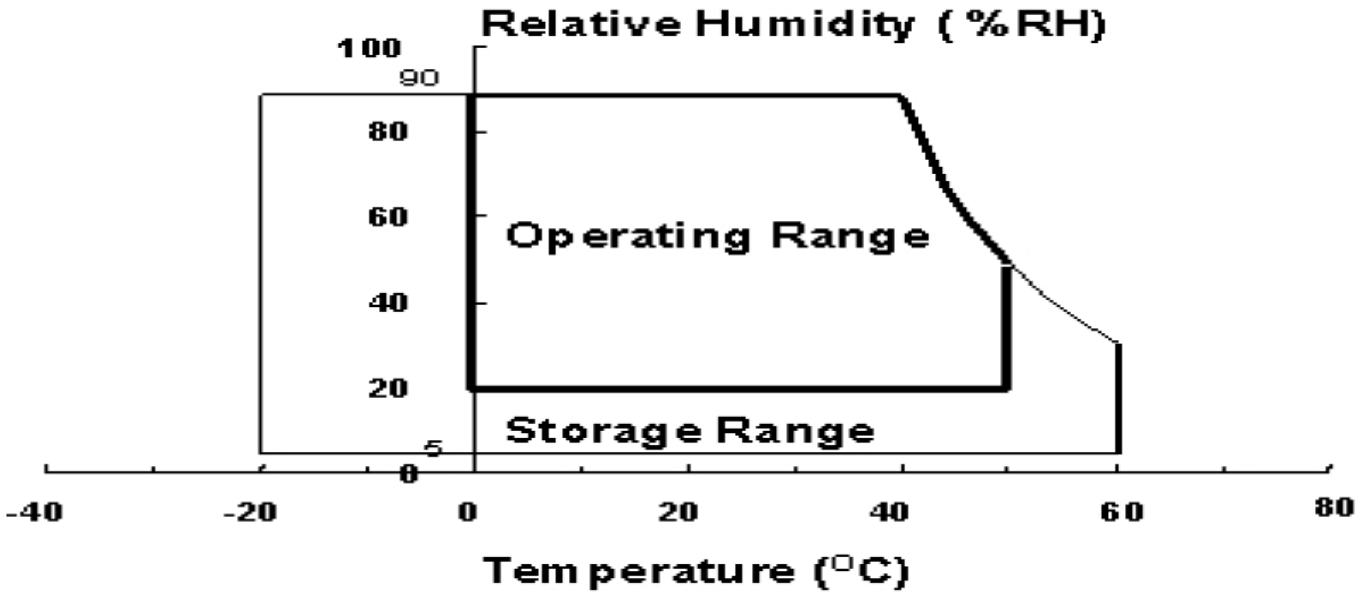

Fig. Temperature and Relative humidity range

2.3. Dimension, Weight and Accessories

Complied regulatory and Guidelines			Defined at 1.2 Regulation
Dimension	Net without stand		W 1026.1mm / H 580.2mm / D 98.1 mm
	Net without stand(Glass)		N/A
	Gross		W: 1200mm / H: 778mm D: 370mm
Weight	Without Glass	Net	< 29.8 kg
		Gross	< 39.6 kg
	With Glass	Net	N/A
		Gross	N/A
Accessories			- Remote Controller (with Battery) - DVI cable - D-SUB cable - RS232 cable(Serial Cable) - User's Manual(English)

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2.4. TFT LCD Panel Specifications

Item			Specifications	Unit	Remarks
Model			Samsung TFT LCD LTI460AA04		
Module Size			1025.653(W_{TYP})x579.844(H_{TYP})	mm	
			59.43(D_{MAX})		
Weight			16,000(Max)	g	
Pixel Pitch			0.7455(H)x0.7455(V)	mm	
Active Display Area			1018.353(H) x 572.544(V)	mm	
Surface Treatment			Haze 40%, Hard-coating(3H)		
Display Colors			8 bit – 16.7M	colors	
Number of Pixels			1366 (H) 768 (V)	pixel	
Color Filter			RGB vertical stripe		
Display Mode			SPVA, Normally Black		
Luminance of White			700(Typ)	cd/m^2	
Contrast ratio (Center of Screen)			2500:1(Min) , 3000:1 (typ.)		(*1)
Back Light Unit (BLU)			CCFL		
Back light unit operating life time			50,000	Hour	Brightness decrease of 50%
Response Time	**Rising**		10(typ)	msec	(*3)
	Falling		6(typ)		
	G-to-G		8(typ)		
Color Chromaticity (CIE 1931)	**Red**	**Rx**	0.643	TYP. +/- 0.03	
		Ry	0.328		
	Green	**Gx**	0.271		
		Gy	0.599		
	Blue	**Bx**	0.143		
		By	0.0060		
	White	**Wx**	0.280		
		Wy	0.290		
Color Temperature			10000	K	
Viewing Angle(Typ.)	**Horizontal**		-89 to 89	Degree	CR>=10(*2)
	Vertical		-89 to 89		
Brightness Uniformity (9 Points)			25	%	(*4)

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2.5. Regulation

The monitor shall be approved / licensed / certified as the Model KT-LS46LMD-S

* NOTE : USE RESTRICTIONS AND LIMITATIONS

This product is not authorized for use in life support devices or systems, military application, or other application which propose a significant risk of personal injury.
Therefore, the product shall not be used for such purpose.

Regulation		Country	Configuration
			KT-LS46LMD-S
Safety	CB Report	International	Y
	UL(NRTL)	USA	Y
	CSA/c-UL	Canada	Y
	CE-Marking	EU	Y
	TUV-GS	Germany	-
	GOST-R	Russia	-
	CCC	China	-
	PSB	Singapore	-
	NOM	Mexico	-
	IRAM	Argentina	-
	KCC	South Korea	Y
EMC (Class A)	FCC-A	USA	Y
	DOC-A	Canada	Y
	CE-Marking	EU	Y
	C-Tick-B	Australia	-
	GOST-R	Russia	-
Others	WEEE	International	Y
	SB 50	US (California)	Y
	RoHS	EU	Y
	Mercury Regulation	USA	Y
	EuP	EU	TBD

• Regulation:

Safety(*: Include EMI or EMC Requirements)

- UL (U.S.A) : UL60950-1
- CSA / c-UL : CAN /CSA -22.2 No.60950-1
- CE-Marking : EN60950-1

EMI / EMC

- FCC (USA) : Part 15B
- DOC (CSA)
- CE : EN55022(EMI), EN55024(EMS)
  : EN 61000-4-2(ESD) / EN 61000-4-3(RS)
  : EN 61000-4-4(EFT) / EN 61000-4-5(SURGE)
  : EN 61000-4-6(CS) / EN 61000-4-11(DIP)
  : EN 61000-3-2 / EN 61000-3-3 / EN 61000-4-8
- -KCC :

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3. Electrical Specifications

3.1. Input signal

Input			Specification			Unit	Remark
			Min	Typ	Max		
PC(VGA) / DVI	Signal	RGB	0.714			Vp-p	
		DVI	T.M.D.S				
	Frequency	H	30.0	-	68.0	KHz	
		V	49	-	61	Hz	
	Separate (H,V) Sync (TTL)	High	2.0	-	5.0	V	
		Low	0	-	0.8		
	DVI (PC to MNT)		Max length : 10			m	TBD
	DVI (Set1 to Set2)		Max length : 1.8			m	
Componen t	YPbPr	Y		1.0		Vp-p	
		Pb/Pr		0.7			
VIDEO	CVBS (Composite)	NTSC		0.714			
				0.286			Sync Signal
		PAL		0.7			
				0.3			Sync Signal
	S-VHS (Y/C)	NTSC		1.0			
				0.286			Sync Signal
		PAL		1.0			
				0.3			Sync Signal
CONTROL	RS-232C(PC to MNT)		Max length : 10			m	TBD

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3.2. Output Signals

Output			Specification			Unit	Remark
			Min	Typ	Max		
PC(VGA) / DVI	Signal	RGB	0.714			Vp-p	
		DVI	T.M.D.S				
	Frequency	H	30.0	-	68.0	KHz	
		V	49	-	61	Hz	
	Separate (H,V) Sync (TTL)	High	2.0	-	5.0	V	
		Low	0	-	0.8		
Component	YPbPr	Y		1.0		Vp-p	
		Pb/Pr		0.7			
VIDEO	CVBS (Composite)	NTSC		0.714			
				0.286			Sync Signal
		PAL		0.7			
				0.3			Sync Signal
	S-VHS (Y/C)	NTSC		1.0			
				0.286			Sync Signal
		PAL		1.0			
				0.3			Sync Signal
CONTROL	RS-232C ('n' MNT to 'n+1' MNT)		Max sets : 16			sets	

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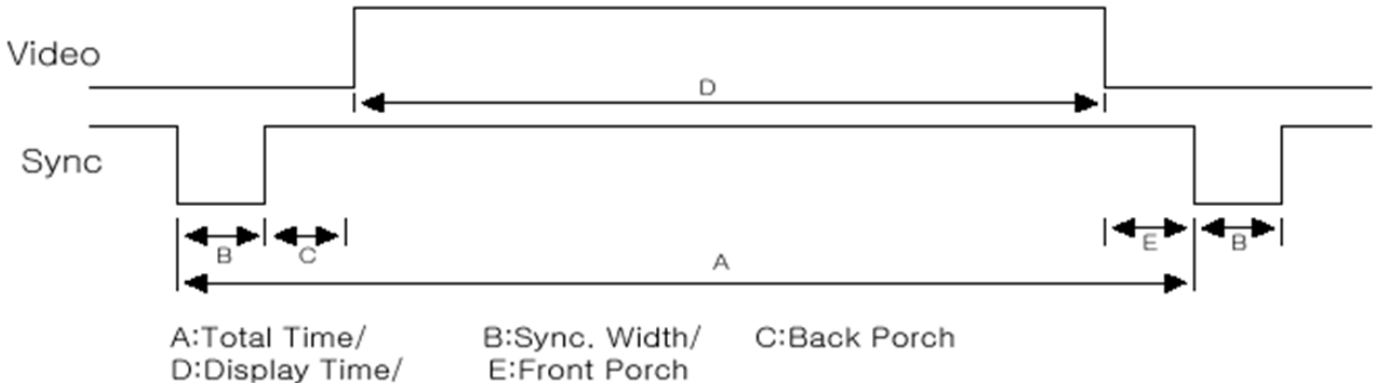
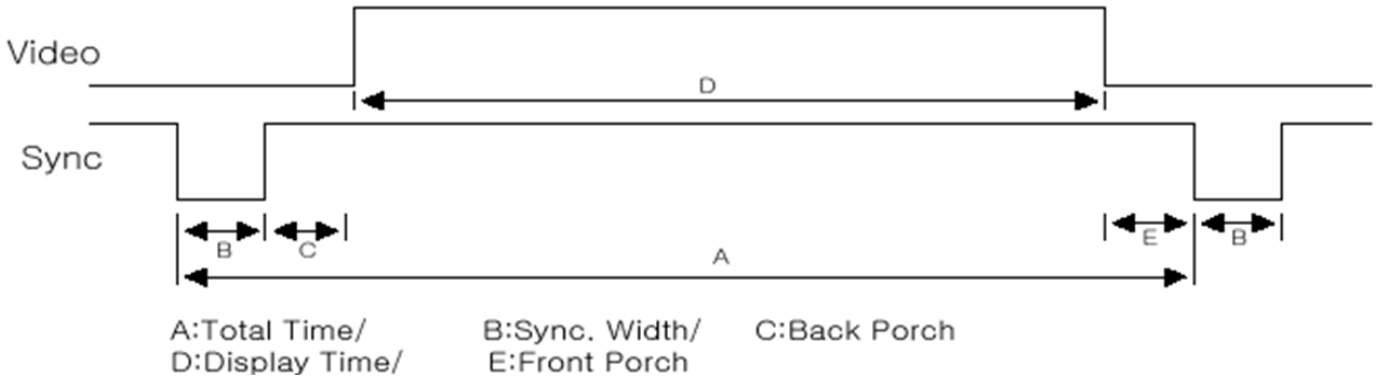
3.3. Preset Signal Timings



< Horizontal Video & Sync >



< Vertical Video & Sync >

3.3.1. Component signal

Signal Timing	480i	480p	576i	576p	720p		1080i		1080p	
Frame Frequency [Hz]	29.97	59.94	25.0	50	59.94	50	29.97	25.0	59.94	50
Entire Lines	525	525	625	625	750	750	1125	1125	1125	1125
Effective Lines	480	480	576	576	720	720	1080	1080	1080	1080
Aspect Ratio	4:3	16:9	4:3	16:9	16:9	16:9	16:9	16:9	16:9	16:9
Line Frequency [KHz]	15.73	31.46	15.62	31.25	44.95	37.50	33.71	28.125	67.42	56.25

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3.3.2. PC(VGA)

Description			Resolution				
			640	800	1024	1280	1366
			480	600	768	1024	768
HORIZONTAL	Freq [KHz]		31.468	37.879	48.780	63.981	47.700
	A: Total	[Dot]	800	1056	1936	1688	1782
	B: Sync width	[Dot]	96	128	96	112	144
	C: Back Porch	[Dot]	56	88	752	248	208
	D: Active	[Dot]	640	800	1024	1280	1366
	E: Front Porch	[Dot]	8	40	64	48	64
	Polarity		-	+	-	+	+
VERTICAL	Freq [Hz]		59.94	60.317	60.001	60.02	60.00
	A:Total	[Line]	525	628	813	1066	795
	B: Sync width	[Line]	2	4	6	3	3
	C: Back Porch	[Line]	41	23	33	38	23
	D: Active	[Line]	480	600	768	1024	768
	E: Front Porch	[Line]	2	1	6	1	1
	Polarity		-	+	-	+	+
Pixel Clock [MHz]			31.5	40.000	94.43	108.0	85.03

3.3.3. DVI Signal

Description			Resolution						
			1366	1368	1368	1280		1920	
			768	768	768	720(720p)		1080(1080p)	
HORIZONTAL	Freq [KHz]		47.7	47.7	47.7	37.5	45	56.25	67.5
	A: Total	[Dot]	1766	1800	1768	1980	1650	2640	2200
	B: Sync width	[Dot]	144	144	144	40	40	44	44
	C: Back Porch	[Dot]	200	216	200	160	220	148	148
	D: Active	[Dot]	1366	1368	1368	1280	1280	1920	1920
	E: Front Porch	[Dot]	56	72	56	440	110	528	88
	Polarity		+	+	+	+	+	+	+
VERTICAL	Freq [Hz]		50	60	50	50	60	50	60
	A:Total	[Line]	954	795	954	750	750	1125	1125
	B: Sync width	[Line]	3	3	3	5	5	5	5
	C: Back Porch	[Line]	23	19	23	20	20	36	36
	D: Active	[Line]	768	768	768	720	720	1080	1080
	E: Front Porch	[Line]	1	1	1	5	5	4	4
	Polarity		+	+	+	+	+	+	+
Pixel Clock [MHz]			84.238	85.896	84.33	74.25	74.25	148.50	148.50

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3.4. Power Supply(SMPS)

Input Voltage	90 to 264 Vac
Frequency	47 to 53 / 57 to 63 Hz
Power Consumption	300W(MAX) 2.73A @110V , 1.36A @220V
AC Leakage Current	IEC 60950 STD Under 5mA
Inrush Current (Cold Start)	40 A_{peak} / 220V
Power Factor	> 0.9

3.5. Power Management

This function conforms DPMS of VESA.

Table 3.4.1 . Power Management condition and status

DPMS	H-sync	V-sync	Display	LED	Power Consumption (W)	Remarks
On state	ON	ON	Normal	GREEN	<300 W	
Not Connected	OFF	OFF	“No Signal” Display	GREEN	< 300 W	
Active off	OFF	ON	“No Signal” Display	GREEN	< 300 W	
	ON	OFF	“No Signal” Display	GREEN	< 300 W	
Stand by (Power off)	N/A	N/A	No Display	RED	< 5W	
Complete	N/A	N/A	No display	OFF	0W	

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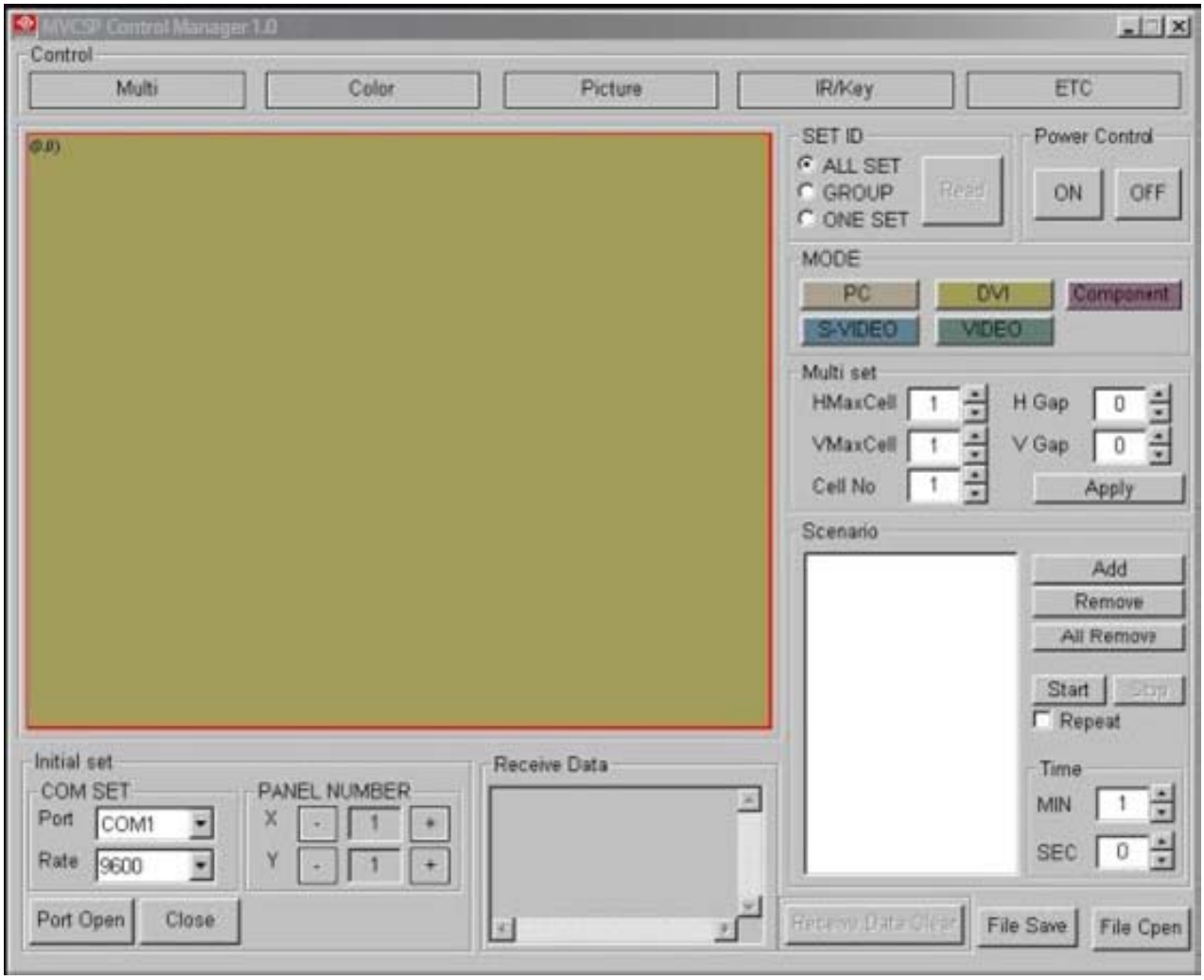
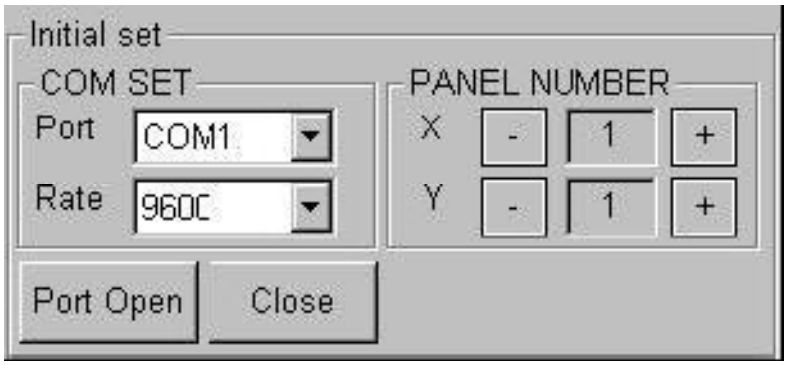
4. MVCSP(Multi Vision Control System Program)

4.1. Setting and Operation of monitor (Main RS 232 Controller Windows)



[Multi Vision Control System Program (MVCSP)]

4.1.1. Setting “Com Port”



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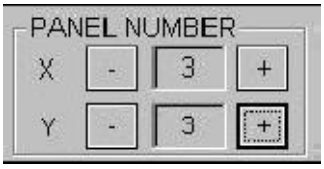
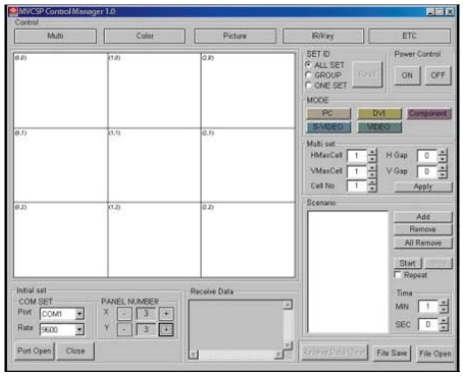
4.2. Setting “Multi Screen” Configuration

4.2.1. Select a desirable X and Y number

- X number represents the number of monitor columns and Y number represents monitor rows
- The range of X, Y number is from 1 to 15



Ex) 3 x 3 screen setting

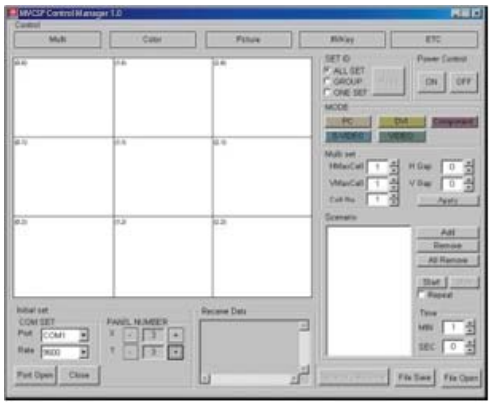


4.2.2. ID Setting

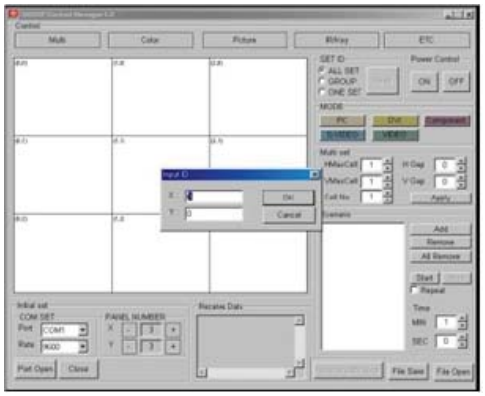
ID of monitor set by DIP switch and set matching ID in MVCSP
Set ID of MVCSP arbitrary (Default ID setting of MVCSP follow coordinate axis)

- Double click desirable screen and set ID of MVCSP
- ID of other screen set as same way.

: The range of X,Y number is from 1 to 15



Default ID setting

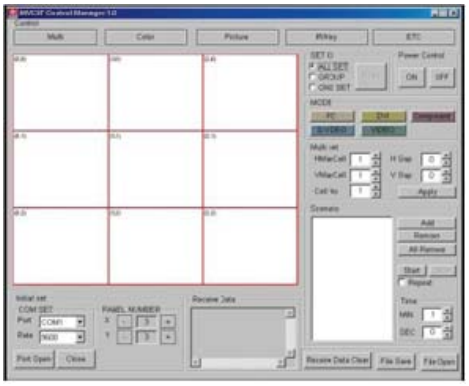


User set ID of MVCSP

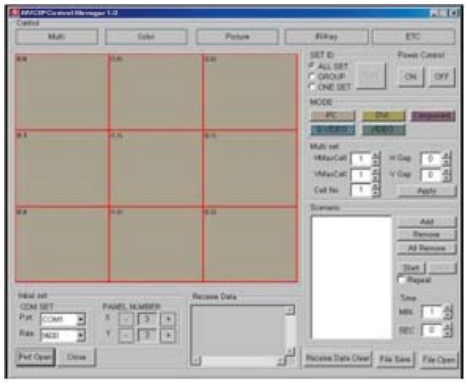
*Recommend – Use default setting

4.2.3. Select one out of 5 input sources such as DVI, PC, VIDEO, S-VIDEO and COMPONENT.

-Select “ALL SET” I SET ID Block.
-Select input mode in “MODE” block.: PC,DVI,COMPONENT,VIDEO,S-VIDEO(HDMI mode is reserved)



[ALL SCREEN SELECTED]



[PC MODE INPUT SELECTED]

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4.2.4. Configure Multi Set

- You can configure 1:1 display or multi display(Output signal control)

<Multi display>

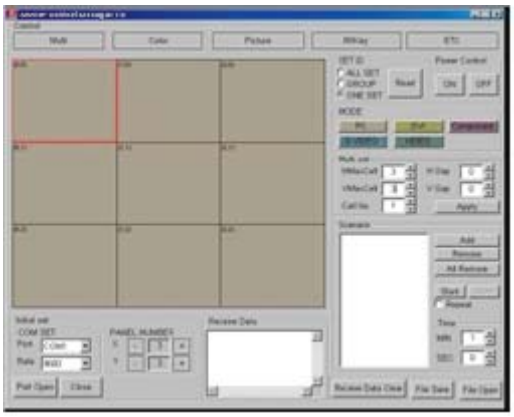
-Check"ONE SET" in SET ID block

-Set up "HMaxCell", "VMaxCell and click "Apply" button each cell

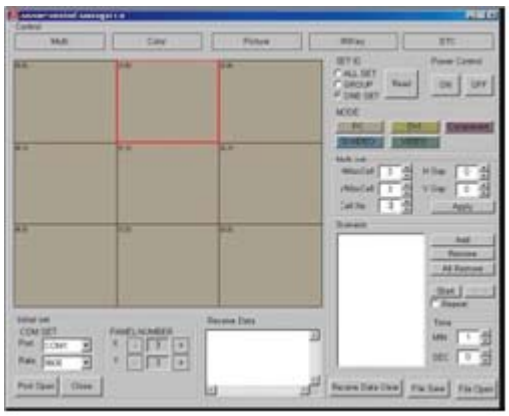
: The range of HMaxCell, VMaxCell number is from 1 to 15

: The range of Cell number is from 1 to 225

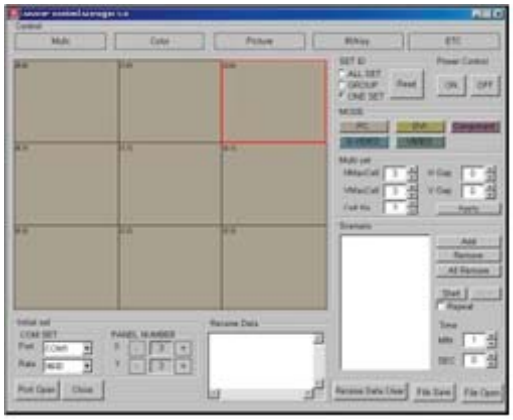
Ex) If "HMaxCell" =3, "VMaxCell"=3 then click "Apply" button 9 times (Set Cell No 1,2,3,4,5,6,7,8,9)



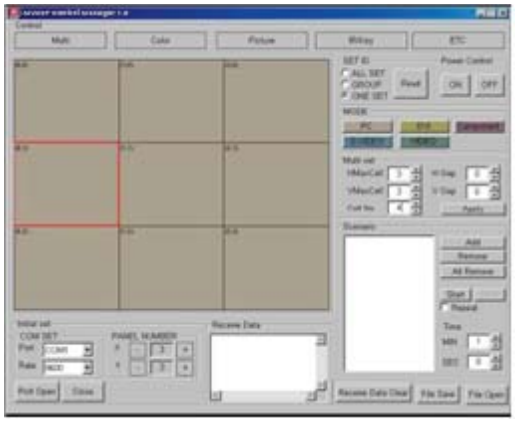
[Set up Call No.1]



[Set up Call No.2]



[Set up Call No.3]



[Set up Call No.4]

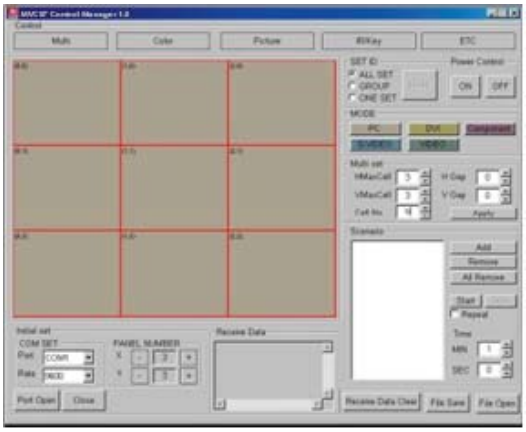
Set up as above picture

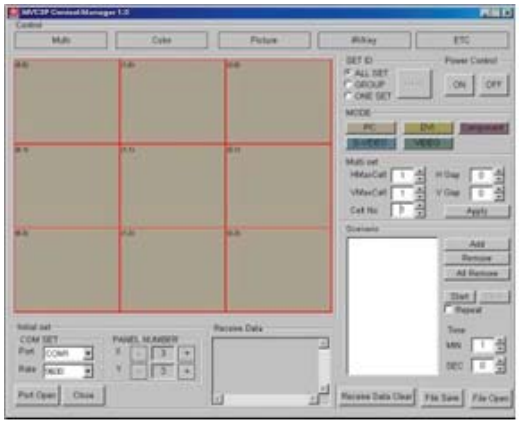
<1:1 display >

-Check "ALL SET" in SET ID block.

-Set up "HMaxCell",VMaxCell" into 1 and click "Apply" button each cell

cf) :HMaxCell"=1, "VMaxCell"=1 then click "Apply" button (Then Cell No change "1")





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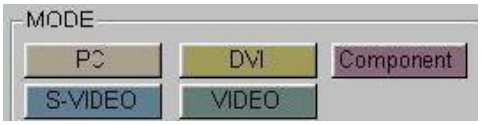
4.3. Configuration of various modes

4.3.1. XNB-46S monitor supported various input mode

- PC, DVI, S-VIDEO, VIDEO, COMPONENT (Yellow HDMI button is reserved)



4.3.2. Check “SET ID” (ALL SET/GROUP/ONE SET)

- Select desirable screen(selected screen is displayed with red square box) and click input mode as you want.
- Then selected screen color changed in specific input mode color.

- You can configure other screen in the same way.
- Selected screen would be converted into other input mode.

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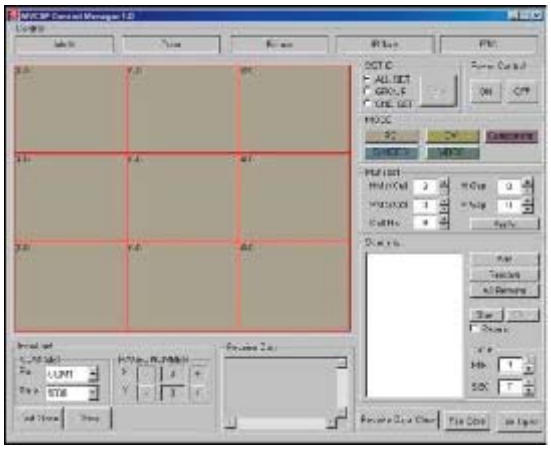
4.4. Scenario Control

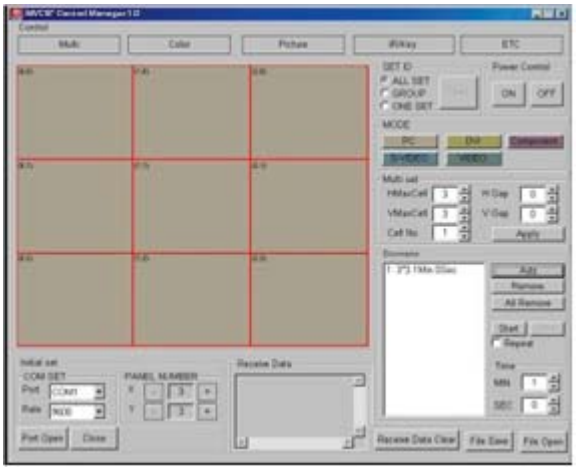
4.4.1. XNB-46S monitor supported Scenario mode

- Make a desirable configuration in multi Screen



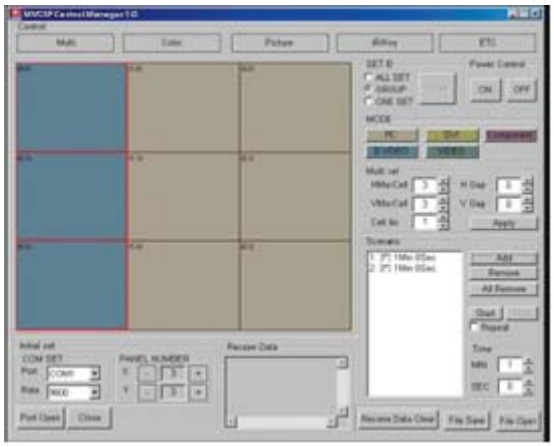
4.4.2. Set “Time” in “Operation Control” (minimum set “Time” : 60sec.)

- Click “Add” button to save first step in scenario.



4.4.3. Save different screen configuration in the same way

- You can select ALL SET or GROUP.



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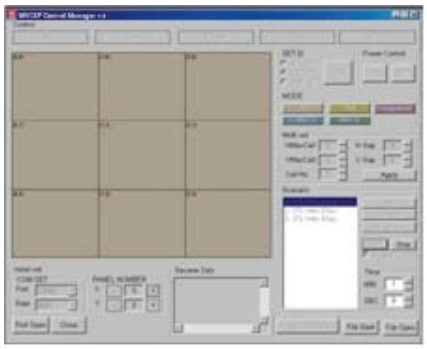
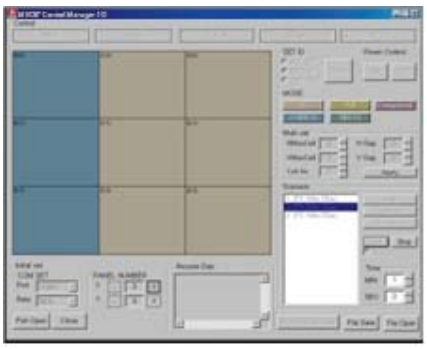
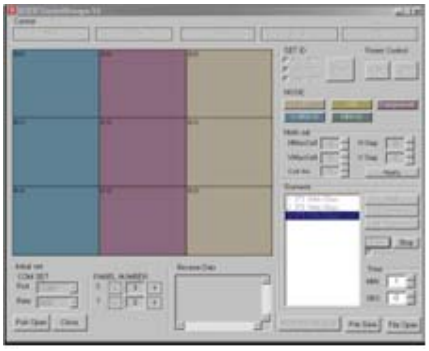
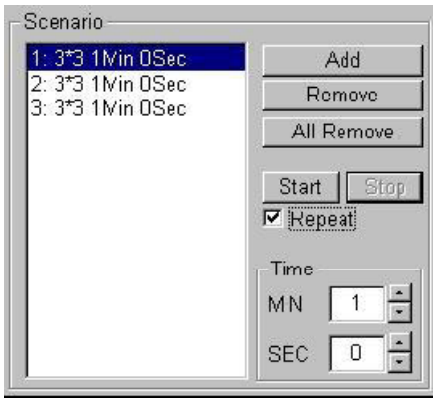
4.4.4. Click “START” button in Scenario to display saved screen configuration.

4.4.5. Check “Repeat” to display saved configuration repeatedly

Click “Remove” and “All Remove” button delete specific slide show operation or all slide show operation



4.5. Setting Color Control

4.5.1. READ operation

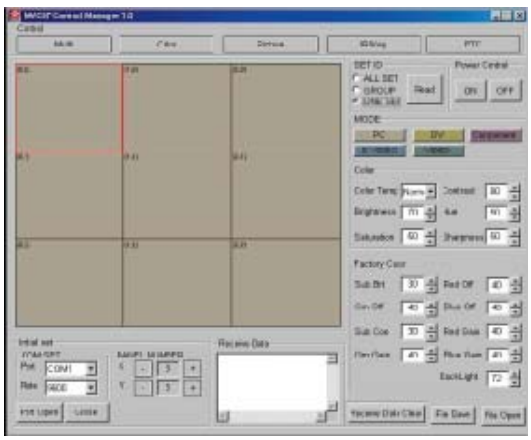
- Select desirable screen and click “Read” button to read color data of selected set.
- Before setting color control, select screen you wanted and read color data first.
- Read operation work properly when you select only I set

4.5.2. In order to setting color control function of specific monitor, select “Color” tab.

4.5.3. Select desirable screen and set each item you want control

4.5.4. In order to control display values, you can input values direct in “EditBox” and press Enter key, or click -/+ button using mouse.

- Check “ALL SET” to transmit command data to all connected monitor regardless of ID.



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4.6. Picture Control

4.6.1. READ operation

- Select desirable screen and click “Read” button to read picture data of selected set.
- Before setting picture data, select screen you wanted and read picture data first.

* Read operation work properly when you select only 1 set.

4.6.2. In order to Picture mode control of specific monitor , select “Picture” tab

4.6.3. Select desirable screen and set each item you want control

- Picture mode
- Picture size

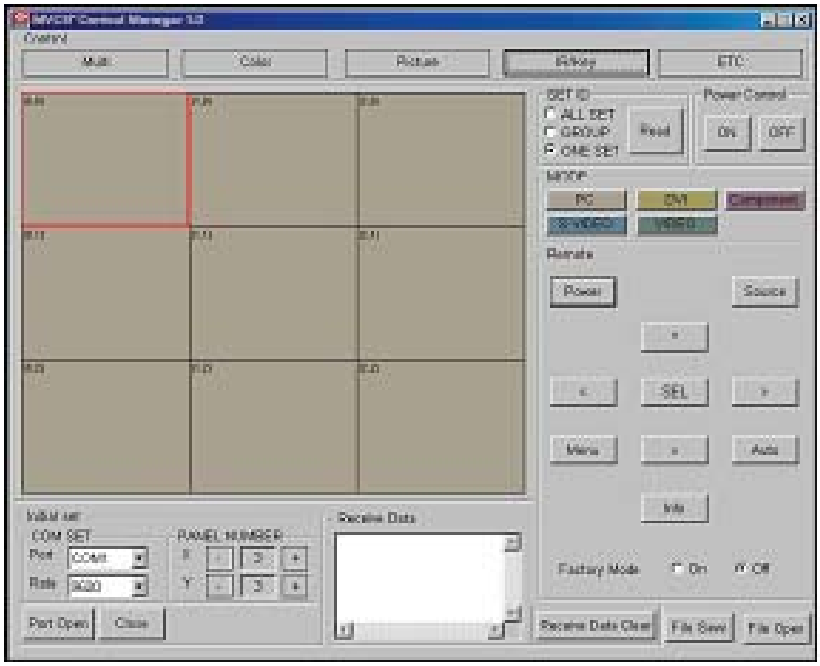
4.6.4. “Auto adjust” button is available when input source is PC

- For auto alignment adjust, click “Auto adjust” button.
- Check “ALL SET” to transmit command data to all connected monitor regardless of ID.

4.7. Remote Control

4.7.1. In order to control OSD Menu of specific monitor, use “REMOTE” button of “IR/KEY” tab after selecting the specific monitor.

- Check “ALL SET” to transmit command data to all connected monitor regardless of ID.

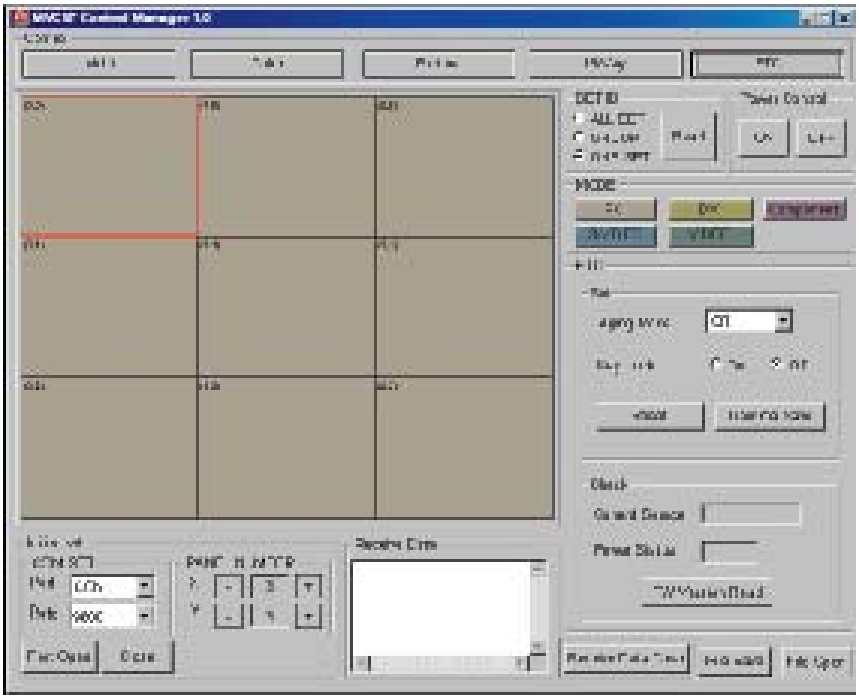


4.8. ETC

4.8.1. Aging Mode operation.

- Select Aging Mode tap and select desirable mode you want.
  Ex) Off / Full White / Full Red / Full Green / Full blue

4.8.2. To check firmware version, you can click “FW Version Read” button



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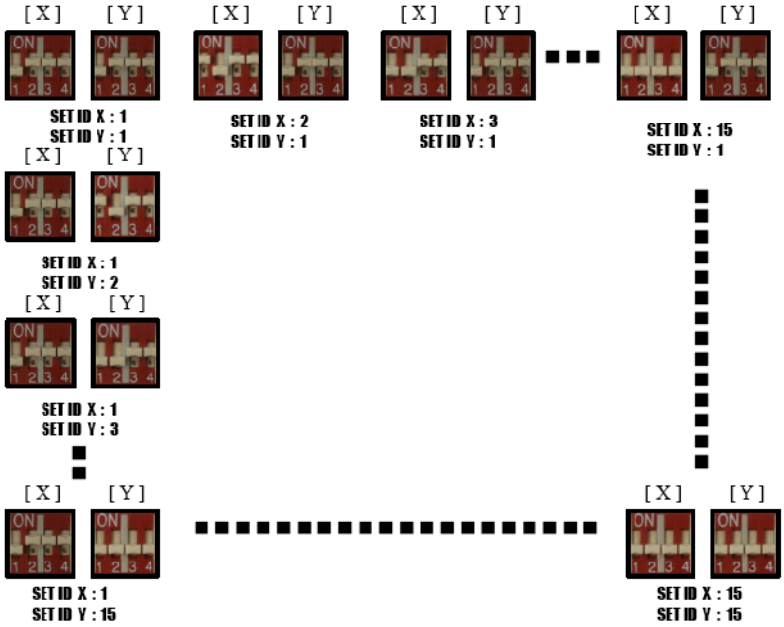
5. General Function and Cable Connection

5.1. Auto Adjust Function

Auto adjust function is performed to detect the input signal format (H/V frequency, video active area, sync pulse and back-porch) by the internal scaler at PC(VGA) input mode.

Adjustment items are H/V-position, Frequency (Clock) and Phase.
Auto adjust function cannot setup perfectly at some PCs.
In this case, the fine turning of “Frequency (Clock)” and “Phase” by manual are necessary.
If you precede the “Auto Adjust” on character mode such as “Dos Prompt mode”, you also cannot setup perfectly.
And if you precede the “Auto Adjust” on dark moving picture, you also cannot setup perfectly too.
So you need preceding “Auto Adjust” at the bright, full sized and still image to get good “Auto Adjust” result.

5.2. Set ID Switch Configuration

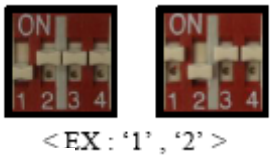

[X] [Y]
SET ID X : 1
SET ID Y : 1
SET ID X : 2
SET ID Y : 1
SET ID X : 3
SET ID Y : 1
SET ID X : 15
SET ID Y : 1
SET ID X : 1
SET ID Y : 2
SET ID X : 1
SET ID Y : 3
SET ID X : 1
SET ID Y : 15
SET ID X : 15
SET ID Y : 15

Note :

- The X/Y coordinates are set to binary code.
- The DIP is used to select Monitor ID.

- X : 1, 2, 3, 4 → 1(Low Bit) / 4(High Bit)
  0 ~ 15

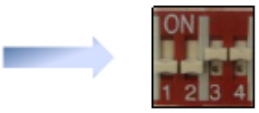
- Y : 1, 2, 3, 4 → 1(Low Bit) / 4(High Bit)
  0 ~ 15



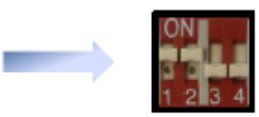
I²C/RS232 Switch Configuration

- First SET

(WHICH IS RECEIVED SIGNAL DIRECTLY FROM PC OR OTHER DEVICE, NOT RELATED WITH MONITOR ID)



- OTHER SET



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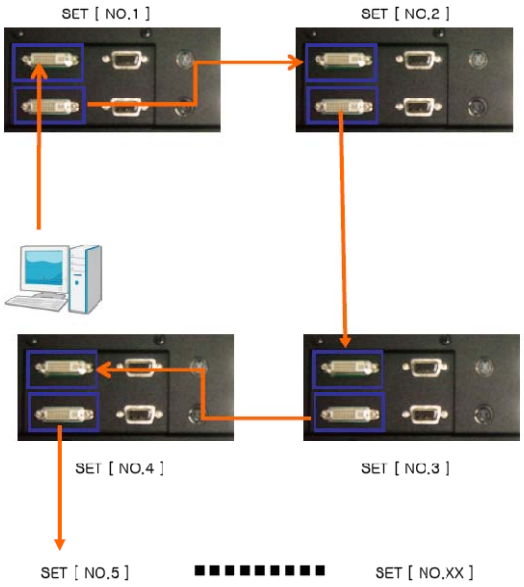
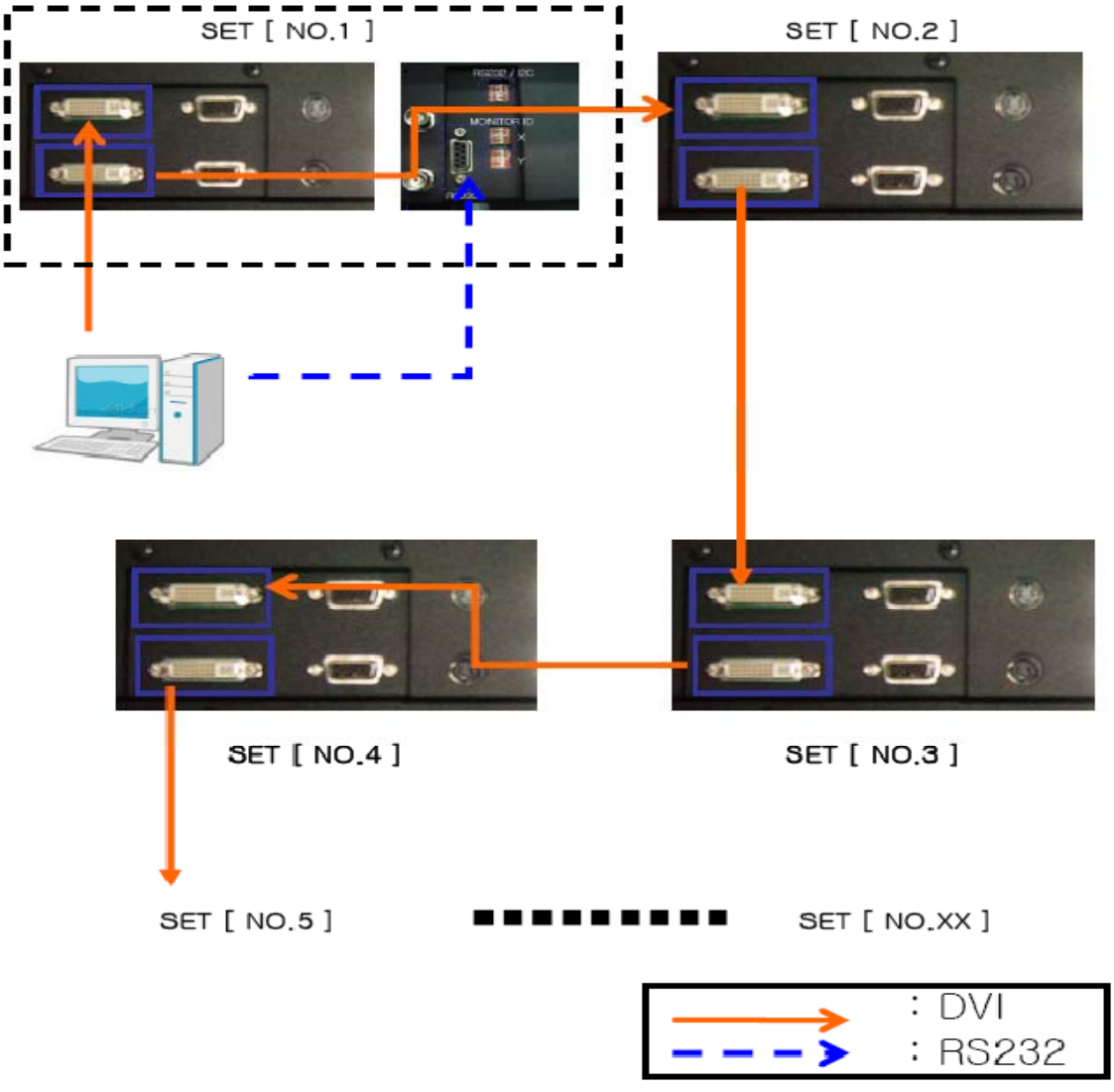
5.3. DVI CONNECTION



5.4. RS-232 CONNECTION

Only Set NO. 1 attach RS232 cable
Always DVI cable attach for RS232 Control



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5.5. RS-232 Control

You can control this monitor by using a personal computer with RS-232 terminal.
RS-232 data transmit through DVI Cable between each set.(w/o First set, using DDC data line- Pin no.6, 7)

5.5.1. RS-232 data flow

Option 1 : Using DVI Cable)

PC → 1st SET → 2ND SET → 3TH SET ……

(using by 9P RS-232 CABLE) (using by DVI cable – DDC data line)

- PC should be connected with 1st set only by using RS-232 CABLE for access EDID data.
  Other sets are connected together for RS-232 data transmission by using DDC data line in DVI cable.
  (Otherwise, only 1st set needs to check EDID DATA with PC.)

Option 2 : Using DVI to RS-232 Cable)

PC → 1st SET → 2ND SET → 3TH SET ……

(using by 9P RS-232 CABLE) (using by DVI to RS-232 Cable)

- PC should be connected with 1st set only by using RS-232 CABLE.
  Other sets are connected together for RS-232 data transmission by using DDC data line in DVI to RS-232 cable.

5.5.2. COM Port setting

Protocol	RS-232
Baud rate	9600bps
Data Bits	8 Bit
Parity bit	None
Stop bit	1 bit
Flow control	None

5.5.3. Control command format

1) Direct control command.

Head	Set Id	Command	End
2 Bytes	3 Bytes	3 Bytes	1 Byte
K:	ALL	PON	.

EX) K:ALLPON. => ALL SET POWER ON
K:001CTU. => SET ID 001 SET CONTRAST 1 STEP UP

2) Value adjust command.

Head	Set Id	Command	Value	End
2 Bytes	3 Bytes	3 Bytes	3 Bytes	1 Byte
K:	ALL	PON	095	.

EX) K:ALLCON095. => ALL SET CONTRAST ADJUST TO 95 LEVEL
K:012BRT080. => SET ID 012 SET BRIGHTNESS ADJUST TO 80 LEVEL

3) Status check command (Only for one set)

(1) Request (from PC)

Head	Set Id	Command	End
2 Bytes	3 Bytes	3 Bytes	1 Byte
K:	001	CON	?

(2) Reply (at Monitor set id 001)

Command	=	Value
3 Bytes		3 Bytes
CON		095

EX) PC => K:001CON (SET ID 001 SET CONTRAST REQUEST)
MONITOR => CON=095 (SET ID 001 SET CONTRAST VALUE=095

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5.5.4. Direct control command table.

No	Command	Description	No	Command	Description
1	PON / POF	Power On / Off	21	STU / STD	Saturation(Color) 1step Up/ Down
2	SPC	Source change to PC	22	SPU / SPD	Sharpness 1step Up/ Down
3	SDV	Source change to DVI	23	BLU / BLD	Backlight 1step Up/ Down
4	SC1	Source change to COMPONENT	24	SBU / SBD	Sub Brightness 1step Up/ Down
5	SSV	Source change to S-VIDEO	25	ROU / ROD	Red Offset 1step Up/Down
6	SAV	Source change to CVBS	26	GOU / GOD	Green Offset 1step Up/Down
7	MHU / MHD	Multi window H Cell max 1step Up/Down	27	BOU / BOD	Blue Offset 1step Up/Down
8	MVU / MVD	Multi window V Cell max 1step Up/Down	28	SCU / SCD	Sub Contrast 1step Up/Down
9	DNU / DND	Multi window Cell No 1step Up/ Down	29	RGU / RGD	Red Gain 1step Up/Down
10	HEU / HED	Multi window H Gap(Edge) 1step Up/ Down	30	GGU / GGD	Green Gain 1step Up/Down
11	VEU / VED	Multi window V Gap(Edge) 1step Up/ Down	31	BGU / BGD	Blue Gain 1step Up/Down
12	CT0	Color temperature set to USER	32	PM0	Picture Mode USER
13	CT1	Color temperature set to COOL1	33	PM1	Picture Mode DYNAMIC/ HIGH(PC/DVI)
14	CT2	Color temperature set to COOL2	34	PM2	Picture Mode STANDARD/ MIDDLE(PC/DVI)
15	CT3	Color temperature set to Normal	35	PM3	Picture Mode MOVIE/ LOW(PC/DVI)
16	CT4	Color temperature set to WARM1	36	PM4	Picture Mode MILD
17	CT5	Color temperature set to WARM2	37	PS0	Size set to WIDE(All source)
18	CTU / CTD	Contrast 1step Up/Down	38	PS1	Size set to 4:3(All source)
19	BRU / BRD	Brightness 1step Up/ Down	39	PS2	Size set to ZOOM(Component, S-Video, CVBS)
20	HUU / HUD	Tint(Hue) 1step Up/ Down	40	PS3	Size set to PANORAMA(Component, S-Video, CVBS)

No	Command	Description	No	Command	Description
41	PS4	Size set to 14:9(Component, S-Video, CVBS)	61	AGW	Aging mode Full White
42	HPU / HPD	H-Position 1step Up/Down	62	AGR	Aging mode Full Red
43	VPU / VPD	V-Position 1step Up/Down	63	AGG	Aging mode Full Green
44	CKU / CKD	Clock 1step Up/Down	64	AGG	Aging mode Full Blue
45	PHU / PHD	Phase1step Up/Down	65	AGF	Aging mode Off
46	ATU	Auto Adjust (only VGA input)	66	STN	Video Still On
47	RPW	Remote control Power key	67	STF	Video Still Off
48	RSO	Remote control Source Key	68	VMN	Video Mute On
49	RUP	Remote control Up key	69	VMF	Video Mute Off
50	RDN	Remote control Down key	70		
51	RRT	Remote control Right key	71		
52	RLT	Remote control Left key	72		
53	REN	Remote control Select key	73		
54	RMN	Remote control Menu key	74		
55	RAU	Remote control Auto key	75		
56	RIF	Remote control Info key	76		
57	KLN / KLF	OSD Key Lock On/Off	77		
58	EIN	Reset(Color)	78		
59	FMN	Factory Mode On	79		
60	FMF	Factory Mode Off	80		

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5.5.5. Value adjust command table.

No	Command	Description	No	Command	Description
1	MHC	Multi window H Cell max (1 ~ 15)	21	VPS	V-Position Setting(0 ~ 100)
2	MVC	Multi window V Cell max (1 ~ 15)	22	CLK	Clock Setting(0 ~ 100)
3	DNO	Multi window Cell No (1 ~ 255)	23	PHS	Phase Setting(0 ~ 100)
4	MHG	Multi window H Gap(Edge) (0 ~ 20)	24		
5	MVG	Multi window V Gap(Edge) (0 ~ 20)	25		
6	CON	Contrast value Setting (0 ~ 100)	26		
7	BRT	Brightness value Setting(0 ~ 100)	27		
8	TIN	Tint(Hue) Setting (0 ~ 100)	28		
9	SAT	Saturation Setting(0 ~ 100)	29		
10	SHA	Sharpness value Setting(0 ~ 100)	30		
11	BLT	Back Light Setting (0 ~ 100)	31		
12	SBR	Sub Brightness Setting (0 ~ 255)	32		
13	ROF	Red Offset Setting (0 ~ 255)	33		
14	GOF	Green Offset Setting (0 ~ 255)	34		
15	BOF	Blue Offset Setting (0 ~ 255)	35		
16	SCO	Sub Contrast Setting (0 ~ 255)	36		
17	RGN	Red Gain Setting (0 ~ 255)	37		
18	GGN	Green Gain Setting (0 ~ 255)	38		
19	BGN	Blue Gain Setting (0 ~ 255)	39		
20	HPS	H-Position Setting(0 ~ 100)	40		

5.5.6. Status check command table.

No	Command	Description	No	Command	Description
1	CSR	Current Source status	21	BGN	Blue Gain value
2	CPS	Current Power status	22	PSZ	Picture Size Setting status
3	MHC	Multi window H Cell max value	23	CRT	Color temperature Setting status
4	MVC	Multi window V Cell max value	24	AGI	Aging mode Setting status
5	DNO	Cell No value	25	FWV	Firmware Version Read
6	MHG	Multi window H Gap value	26		
7	MVG	Multi window V Gap value	27		
8	CON	Contrast Value	28		
9	BRT	Brightness value	29		
10	SAT	Saturation(Color) value	30		
11	TIN	Tint(Hue) value	31		
12	SHA	Sharpness value	32		
13	BLT	Backlight value	33		
14	SBR	Sub Brightness value	34		
15	ROF	Red Offset value	35		
16	GOF	Green Offset value	36		
17	BOF	Blue Offset value	37		
18	SCO	Sub Contrast value	38		
19	RGN	Red Gain value	39		
20	GGN	Green Gain value	40		

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6. OSD FUNCTION

Main Menu	Sub Menu	Adjust item		option
Picture	Picture Mode	User, Dynamic, Standard, Movie, Mild		
	User	Contrast, Brightness, Sharpness(S-Video/AV/Component), Color (S-Video/AV/Component), Tint(S-Video/AV)		
	Color Tone	User(Red, Green, Blue) , Cool1(9300K),, Cool2(10000K), Normal(6500K) Warm1(6200K), Warm2(5500K),		
	Size	PC/DVI input – Wide(16:9), 4:3 Component/S-Video/CVBS input – Wide(16:9), 4:3, Zoom, Panorama, Zoom, 14:9		
	PC	**Auto Adjust**	H/V position, clock, clock phase,	
		Phase	Adjust the PC Phase.	
		H-Position	Adjust the PC input H-Position	
		V-Position	Adjust the PC input V-Position	
		Frequency	Adjust the PC input Frequency	
Setup	Reset	All of user setting to be reset as defaults.		
	Time	**Clock**	Adjust present time setting	
		On Timer	Turn on time setting	
		Off Timer	Turn off time setting	
	Language	English, Spanish, German, French		
	OSD Tone	Turn on /off OSD background blending		
	Key Lock	Turn on/off Key Lock function(Power Key is not locked)		
Multi (OSD Language English only)	Multi Function	**H Cell Max**	Adjust Horizontal Max Cell	
		V Cell Max	Adjust Vertical Max Cell	
		Cell Number	Adjust display No	
		H Gap Adjust	Adjust Horizontal Gap	
		V Gap Adjust	Adjust Vertical Gap	
		SET ID X	Display Set ID X (Read Only)	
		SET ID X	Display Set ID Y (Read Only)	

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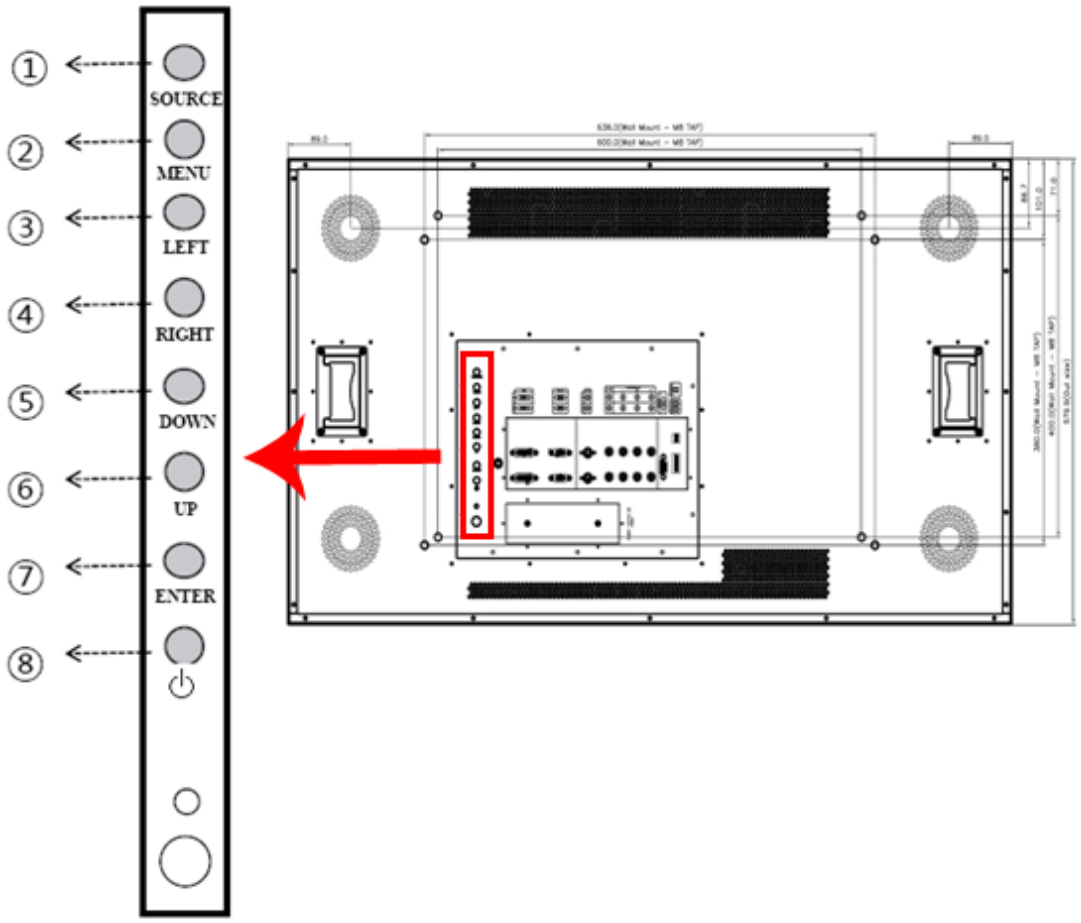
6.1. OSD Key Function



①. SOURCE	▶ This button is used to active and deactivate source select OSD.
②. MENU	▶ This button has two functions, the one is to active and deactivate OSD menu and the other is to return to previous menu
③. LEFT	▶ This button is used to decrease the value of OSD menu. ▶ After choosing the OSD menu and this button is pushed the value of OSD will be decreased.
④. RIGHT	▶ This button is used to increase the value of OSD menu. ▶ After choosing the OSD menu and this button is pushed the value of OSD will be increased.
⑤. DOWN	▶ This button is used to navigate OSD menu. ▶ When the OSD main menu or sub-menu is popped up, if this button Is pushed the active menu move to lower menu
⑥. UP	▶ This button is used to navigate OSD menu. ▶ When the OSD main menu or sub-menu is popped up, if this button Is pushed the active menu will move to upper menu
⑦. ENTER	▶ Confirm your choice / move to the right
⑧. POWER	▶ Power On / Off Button

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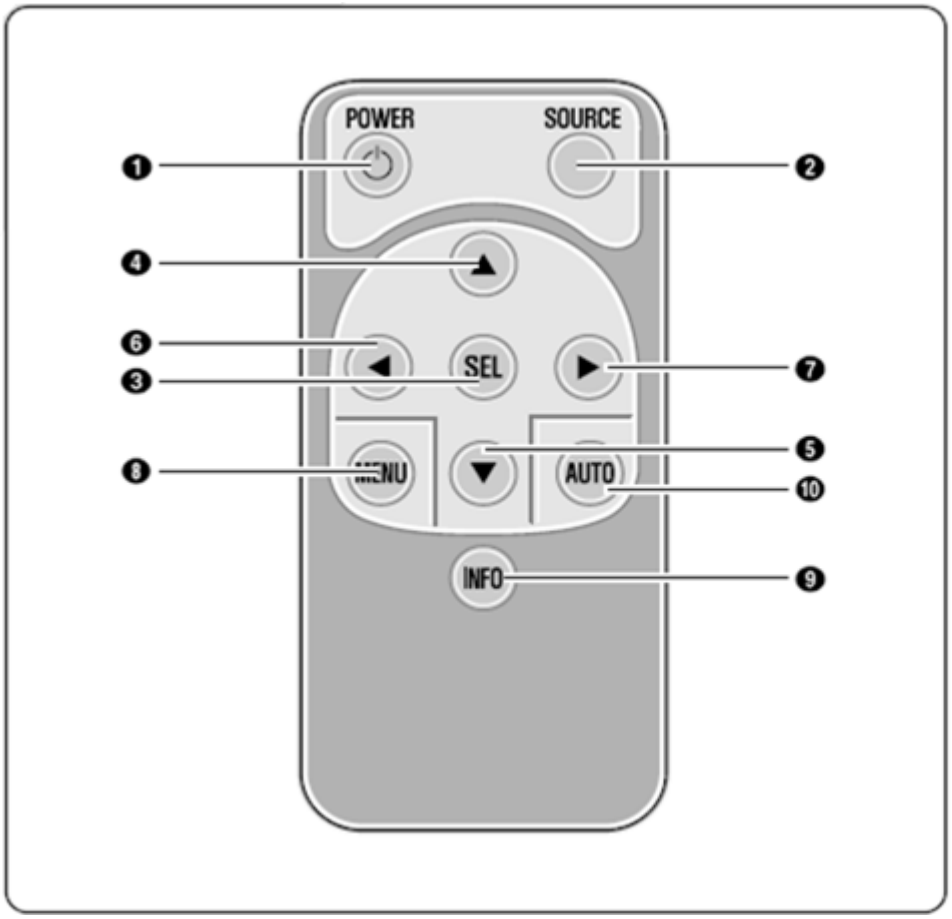
6.2. Remote Control



(1) Power : Power On / Off button
(2) SOURCE : Selects the external input source
(3) SEL : Confirm your choice
(4) ▲ : UP (Function Control in the OSD)
(5) ▼ : Down (Function Control in the OSD)
(6) ◄ : Left (Function Control in the OSD)
(7) ► : Right (Function Control in the OSD)
(8) MENU(On Screen Display) : Activates the OSD menu returns to the previous menu
(9) INFO : Information Display
(10) Auto : Automatically adjust position & horizontal size, phase (PC mode only)

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6.3. OSD Menu Control

Note : Bold text – Key button (Remote control button)

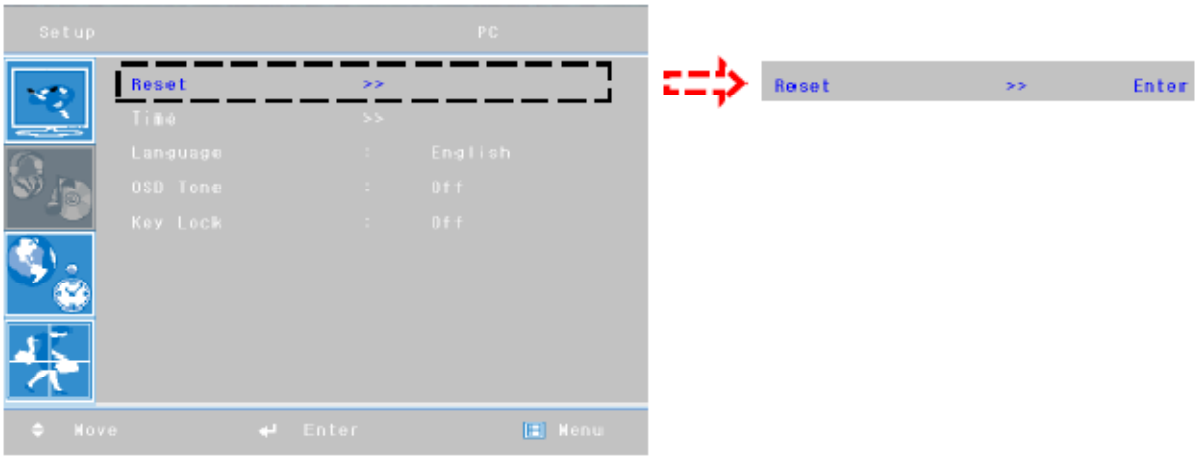
▶ Select Input Source

1. Press the SOURCE button.
2. Select the required device by pressing the UP or DOWN Button repeatedly.

   The input source is displayed in following order :

   PC → DVI → S-Video → AV
3. Press the SELECT button.

▶ Select your Setup



1. Press the MENU button.
2. Press the UP or DOWN button to select OSD group and then press SELECT button.

   ● The menu SETUP is selected.
3. Select the Reset by pressing the VOL L (▶) or SEL button repeatedly.

   ● The Reset select the VOL L (▶) the ENTER..

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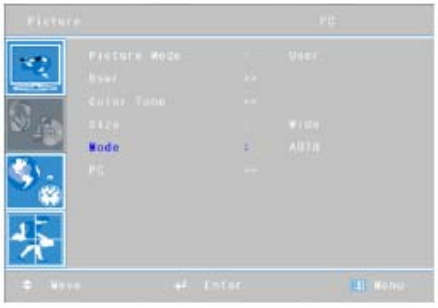
▶ Changing the Time Clock

1. Press the MENU button.

2. Press UP or DOWN button to select Time group.
   Press the SELECT or (▶) button.

3. Select the Real Time mode are available :
   Clock – On Timer (on / off) – Off Timer (on / off) – On Source (PV –DVI – Component – S-video – AV).

▶ Changing the Mode



1. Press the MENU button.

2. Press the UP or DOWN button to select Picture group.

3. Press the UP or DOWN button to select mode.

4. Select the Mode by pressing the SEL or (▶) button.
   ex.) 1366 X 768 50/60Hz

5. When you finish to select, press the MENU button to return to the previous menu.

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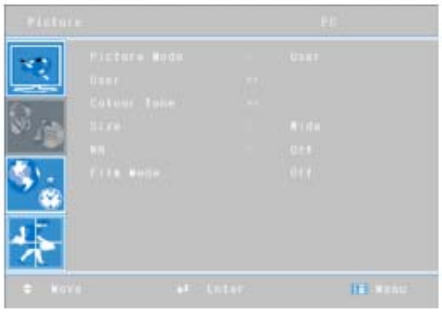
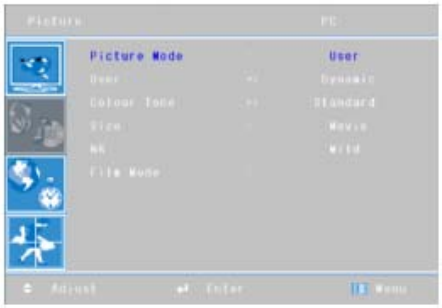
▶ Changing the Mode





1. Press the MENU button.
2. Press the UP or DOWN button to select Picture group.
   Press the SEL or (▶) button.
3. Press the UP or DOWN button to select Picture Mode.
4. Select the Picture Mode by pressing the SEL or (▶) button.

   The screen picture are displayed in the following order :
   User – Dynamic – Standard – Movie - Mild
5. When you finish to select, press the MENU button to return to the previous menu.

▶ Changing the User adjust.

1. Press the MENU button.
2. Press the UP or DOWN button to select User group.
   Press the SEL or (▶) button.

   Select the option (Brightness, Contrast, Color, Tint, Sharpness) to be adjust by pressing the UP or Down Button.
3. Press the Auto (◀) or SELECT (▶) button to reach the required setting.
4. When you finish to select, press the MENU button to return to the previous menu.

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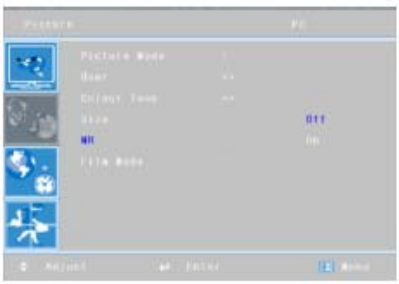
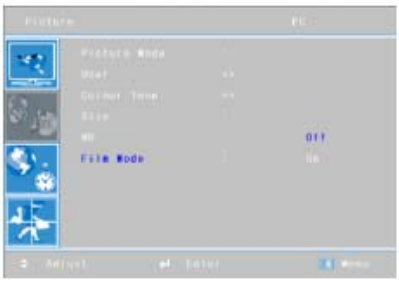
▶ Changing the Picture Size

1. Press the MENU button.
2. Press the UP or DOWN button to select Picture group.
   Press the SEL or (▶) button.
3. Press the UP or DOWN button to select Size.

   The screen sizes are displayed in the following order :
   Wide – Panorama – Zoom – 4:3 – 14:9



4. Select the Size by pressing the UP or DOWN button.
   and Press the SEL or (▶) button select
5. Press the UP or DOWN button to select NR (Noise Rate).
   and Press the SEL or (▶) button select (on / off select)
6. Press the UP or DOWN button to select Film Mode.
   and Press the SEL or (▶) button select (on / off select)



7. When you finish to select, press the MENU button to
   return to the previous menu.

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▶ Changing the Color Tone

1. Press the MENU button.

2. Press the UP or DOWN button to Color Tone group.
   Press the SEL or (▶) button.

3. Press the SEL or (▶) button to select Color Tone.

4. Select the Color Tone by pressing the SEL or (▶) button.

   The Color Tone are displayed in the following order :
   User – Cool2 – Cool1 – Normal – Warm1 – Warm2

5. Select the User by pressing the SEL or (▶) button.

   The Color Tone are displayed in the following order :
   Red : 50 / Green : 50 / Blue : 50 (default)

6. When you finish to select, press the MENU button to return
   To the previous menu.

The Controls of the Red Color. →

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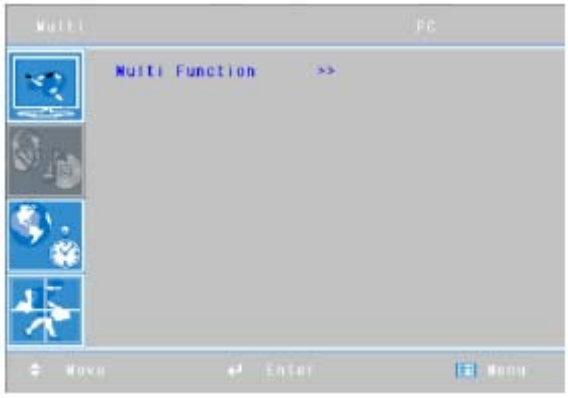
▶ Changing the Multi Function



1. Press the MENU button.

2. Press the UP or DOWN button to select Multi group.
   Press the SEL or (▶) button.

3. Press the SEL or (▶) button to select Multi Function.

   * The H Cell Max / V Cell Max displays available selection as below : 1 ~ 15

   * Cell Number : Monitor Number available selection below : 0 ~ 255

   * The H Gap Adjust / V Gap Adjust available selection as below : 1 ~ 20

   * SET ID X / SET ID Y Adjust available selection as below : 1 ~ 15

   - Press UP or DOWN button to change value.

4. When you are finished to select,
   press the MENU button to return to the previous menu.

H Cell Max / V Cell Max : V/H Display Multi value
Cell Number : Monitor Number value
H Gap / V Gap : The Bezel Gap Size Adjust
SET ID X / SET ID Y : SET ID for RS232 Control

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7. Product Performance

7.1. Test condition

AC voltage	100/240 VAC 60/50Hz
Video signal	1366x768 @60Hz 0.7Vp-p
Aging times	30min in Aging mode(Full White)
Viewing distance	2 to 3 m
Ambient temperature	20 to 25 deg C.
Relative humidity	40 ~ 80 %
Setting	Middle Picture Mode at DVI input (Max condition : Brightness=100,Contrast=100 at User Picture mode)
Ambient illumination	300 to 700 (normal 500) Lux
Luminance meter	Topcon BM-7 or same equivalent
Inspection area	Active area

7.2. Luminance

Luminance	more than 500 cd/m^2
Brightness Uniformity	less than 25 %

(Note) Judge point for brightness uniformity
Brightness uniformity is judged at nine(9) points on display area:
The brightness uniformity (Buni) is defined as the following equation.

$$\text{Buni} = \frac{(\text{Bmax} - \text{Bmin})}{\text{Bmax}} * 100$$

Bmax = Maximum brightness among nine(9) measuring points.
Bmin = Minimum brightness among nine(9) measuring points

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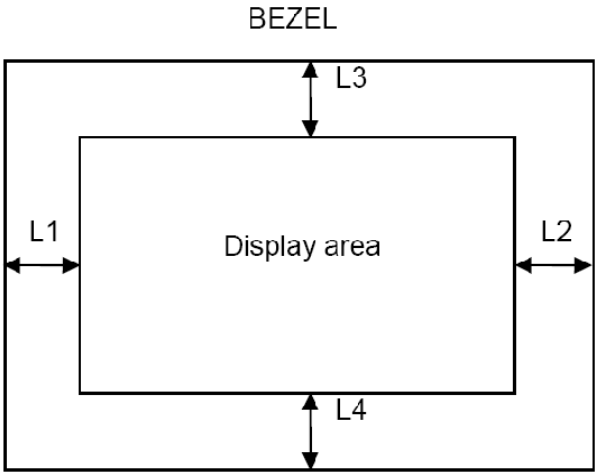
7.3. Geometry

1366 x 768 @ 60Hz(all White) Display area does not hide in Front Cabinet.

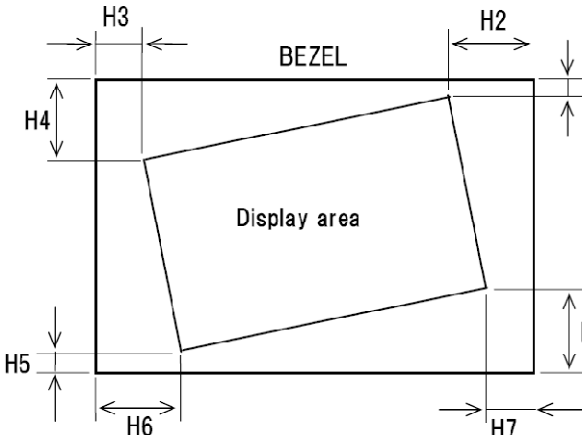


L1, L2, L3, L4 >= 0mm

Display area does not hide in Front Cabinet.

7.4. Rotation (TBD – defined when CS sample available)

1366 x 768 @60Hz (all White)



H1 >= 0.0mm	H5 >= 0.0mm
H2 >= 0.0mm	H6 >= 0.0mm
H3>= 0.0mm	H7 >= 0.0mm
H4>= 0.0mm	H8 >= 0.0mm

Display area does not hide in Front Cabinet.

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8. Inspection Criteria (TBD – defined when CS sample available)

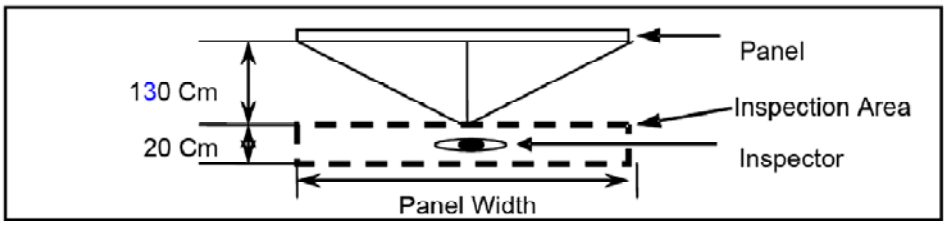
8.1. Conditions

8.1.1. Ambient condition

(1) Ambient illumination : 300 to 700Lux (nominal 500Lux)
(2) Ambient temperature : 25 + - 5degC
(3) Ambient humidity : 50 + - 10%

8.1.2. Viewing Distance

130~150 cm apart from the surface of LCD module, means even though
defect is visible within 1 m, but invisible from more 1m then, not consider as defect.



8.1.3. Viewing angle

The surface of the module and the inspector's line of view shall be at 90 degrees.

8.1.4. Test Signal

Input signal : standard preset timing (1366x768@60Hz)

8.1.5. Inspection area

Viewable (active) area (1018.3mm x 572.5mm)

8.2. Dot Defect Criteria

8.2.1. Definition of Dot Defect

If the luminance of dot is brighter or darker than surrounded dots, then it is called as dot defect.

8.2.2. Dot Inspection

Dot Defect Type Dot Defect Type		**Max**
High Dot	Random	5
	Adjacent 2 dots	3
	Adjacent 3 dots	1
Low Dot	Random	15
Off Dot	Random	10
	Adjacent 2 dots	5
	Adjacent 3 dots	3
Total amount of Dots		20
Minimum Distance between defects	High dot High dot	5mm
	Off dot Off dot	Ignore

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8.2.3. Dot Classification Method

The criteria of dot is defined by its brightness like below.

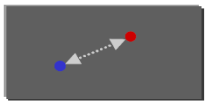
8.2.3.1. Brightly visible dot comparing with background

Step 1) Start dot defect test at 0% Gray Pattern * If visible Go to 25% Gray Pattern
Step 2) At 25% Gray Pattern
* If brightly visible → For Red/Blue, go to 50% Gray Pattern
For Green, go to 30% Gray Pattern
* If invisible →No count
Step 3) At 50% Gray Pattern for Red/Blue
At 30% Gray Pattern for Green
* If brightly visible → High dot
* If Invisible → Low Dot

8.2.3.2. Darkly visible dot comparing with background

Looks relatively dark at 100% Gray R, G ,B , White pattern. → Off dot

8.2.4. Minimum Distance between Dot Defects



Minimum distance is direct distance like left

8.3. Definition of Uniformity Defect

While operating LCD panel, if certain area is brighter or darker remarkably, then regards as uniformity defect. However, extraneous substances which can be wiped out, like finger print, particles, are not considered as a uniformity defect.

8.4. Spot and Linear Type Inspection

Inspection

Defect Type	Criteria	Max
Spot Defect	0.1 < D <= 3 (mm)	10
Linear Defect	0.01 < W <= 0.7 (mm) Criteria	15
	2 < L <= 15.0 (mm) Criteria	
Total amount of Defects		20

8.5. Light Leakage

There shall be no visible light around the edges of the screen.

8.6. Visual Appearance Defect Criteria

8.6.1. Definition of Visual Appearance Defect

Visible defect at non-operating LCD panel status

8.6.2. Visual Appearance Inspection

Inspection

Defect	Criteria	Max
Chassis Gap	Gap =< 1.5 (mm)	-
Spot Defect	0.1 < D <= 5.0 (mm)	10
Linear Defect	0.01 < W <= 0.7(mm)	15
	2.0 < L <= 20.0 (mm)	
Total amount of Defects		20

8.7. Accessories

User's manual	**English (CD)**
CTRL Cable	DVI to RS_232 Cable 1.8M
Remote Control	Remote Control (with battery)

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9. Notice for Handling

A LCD (Liquid Crystal Display) has the following specific characteristics.
These characteristics are not indicative of a defect or malfunction.
(a) The display condition of a LCD may be affected by the ambient temperature.
(b) The LCD uses CCFL for backlight.
Optical characteristics such as brightness or uniformity will change during the LCD's life time
(c) Uneven brightness and/or small spots may appear depending on different display patterns.

(1) When the module is assembled, It should be attached to the system firmly using every mounting holes. Be careful not to twist and bend the modules.

(2) Refrain from strong mechanical shock and / or any force to the module.
In addition to damage, this may cause improper operation or damage to the module and CCFL back-light.

(3) Note that polarizers are very fragile and could be easily damaged.
Do not press or scratch the surface.

(4) Wipe off water droplets or oil immediately.
If you leave the droplets for a long time, Staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane.
Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride.
It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth.
In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static , it may cause damage to the CMOS Gate Array IC.
Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(9) Do not disassemble the module.

(10) Do not pull or fold the lamp wire.

(11) Do not adjust the variable resistor which is located on the module.
Protection sheet for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Image persistence

Image persistence is when a residual or “ghost” image of a previous image remains visible on the screen.
Unlike CRT monitors, LCD monitors image persistence is not permanent, but constant images being displayed for a long period of time should be avoided. To alleviate image persistence, turn off the monitor for as long as the previous image was displayed. For example, if an image was on the monitor for one hour and a residual image remains, the monitor should be turned off for one hour to erase the image.

NOTE: As with all personal display devices, recommends using a moving screen saver at regular intervals whenever the screen is idle or turning off the monitor when not in use.

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10. Mechanical Specifications

10.1. Master Frame

Metal material	EGI (Compatible with SECC) – ALL Mechanical Parts
Master Frame color	Silver(Natural without painting)
Master Frame dimension with glass	N/A
Master Frame dimension without glass	W 1026.1 / H 580.2 / D 98.1 mm / See Fig.1
Control switch	See Fig.1
Bezel logo	See Fig.1

10.2. Rating Label

Color: TBD / See Fig.2

10.3. Carton Box

Paper material	double wall corrugated fiberboard
Carton box print	See Fig.3 → T.B.D
Outer Dimension	W: 1200mm H: 778mm D: 370mm
Packing style	TBD

10.4. Weight

Net	< 29.8 kg
Gross	< 39.6 kg

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11. Environment Conditions

11.1. Temperature, Relative Humidity

	Operating	Storage and shipment
Temperature	5 ~ 40 ºC	-20 to 60 ºC.
Related humidity	20 to 90 % $T_{ambiant}$ <= 39 ºC	10 to 90% without condensation

11.2. Random Vibration test (Packing)

Test Axis	3axis
Search frequency	5 - 200 Hz
Acceleration	0 - 14.406 m/s^2 (rms)
Dwelling time	30minutes 3axis
Mounting	Fixed firmly on the vibration table

11.3. Random Vibration test (Unpacking-Operational)

Test Axis	1axis
Search frequency	5 - 200 Hz
Acceleration	0 – 2.0776 m/s^2 (rms)
Dwelling time	11minutes 1axis

11.4. Drop test (Packing)

Test point	Height
Bottom side	20 cm

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12. TROUBLESHOOTING CHECKLIST

If you have a problem setting up or using your set, you may be able to solve it yourself.
Before contacting customer service, try the suggested actions that are appropriate to your problem.

No picture	▶ Check whether the product is turned on.
	▶ Is the power cord inserted into wall power outlet?
	▶ Test the wall power outlet, plug another product's power cord into the outlet where the product's power cord plugged in.
	▶ Check the picture contrast and brightness settings.
Screen is black and power indicator light is orange color	▶ On your computer check : Power, Signal Cable.
	▶ The set is using its power management system.
	▶ Move the computer's mouse or press any key on the keyboard.
Picture appears slowly after switching on	▶ This is normal, the image is muted during the product startup process. Please contact your service center, if the picture has not appeared after five minutes.
The signal is out of range	▶ Adjust resolution.
	▶ Check it whether the signal cable is connected or loose.
	▶ Check the input source.
Screen color is unstable or single color	▶ check the signal cable
	▶ Reinstall the PC video card.

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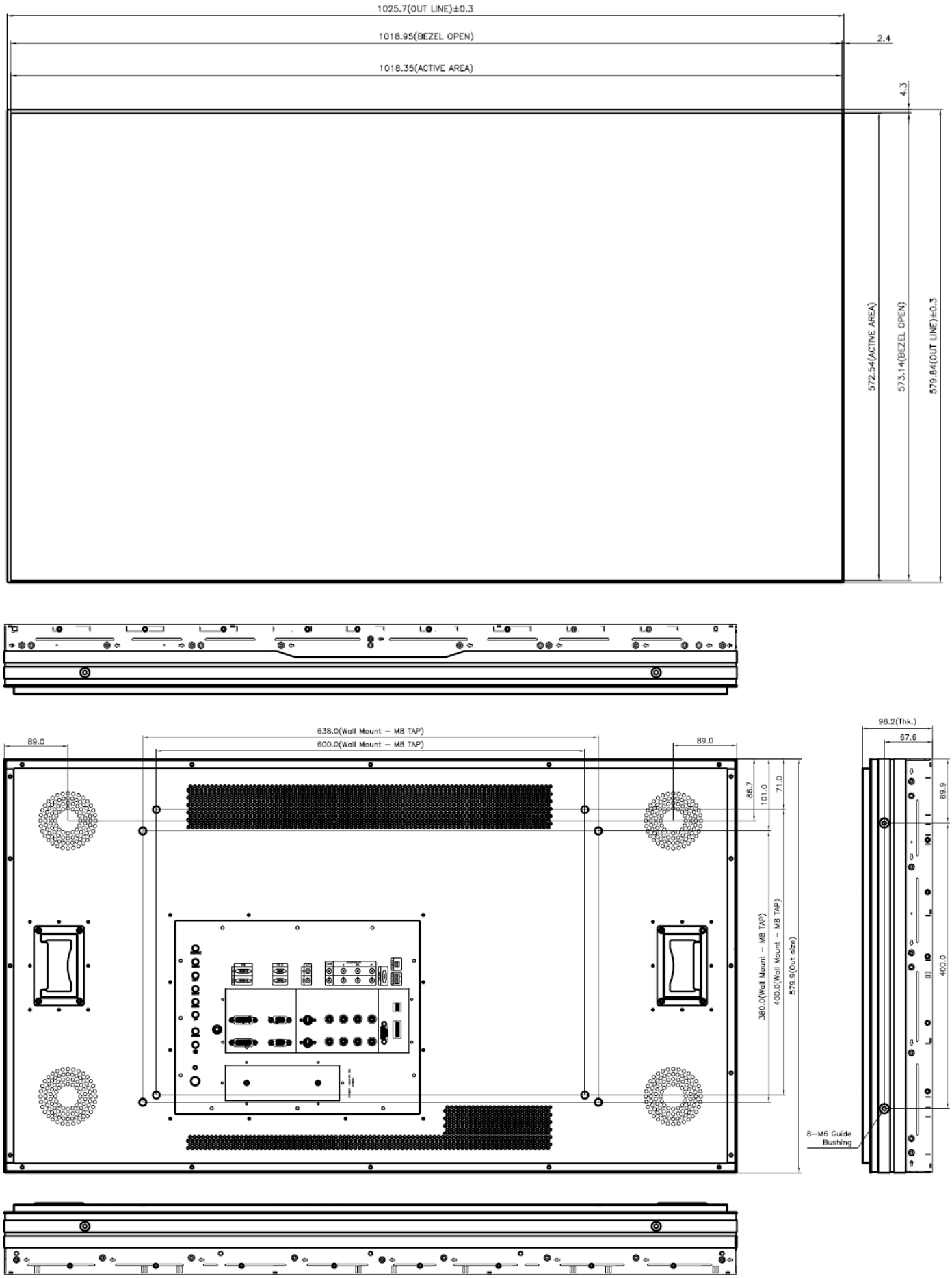
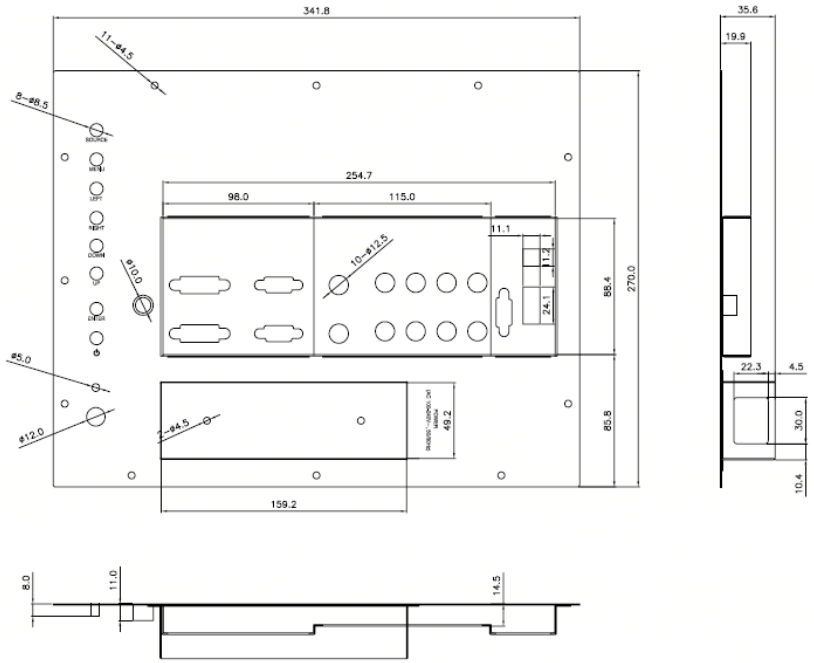
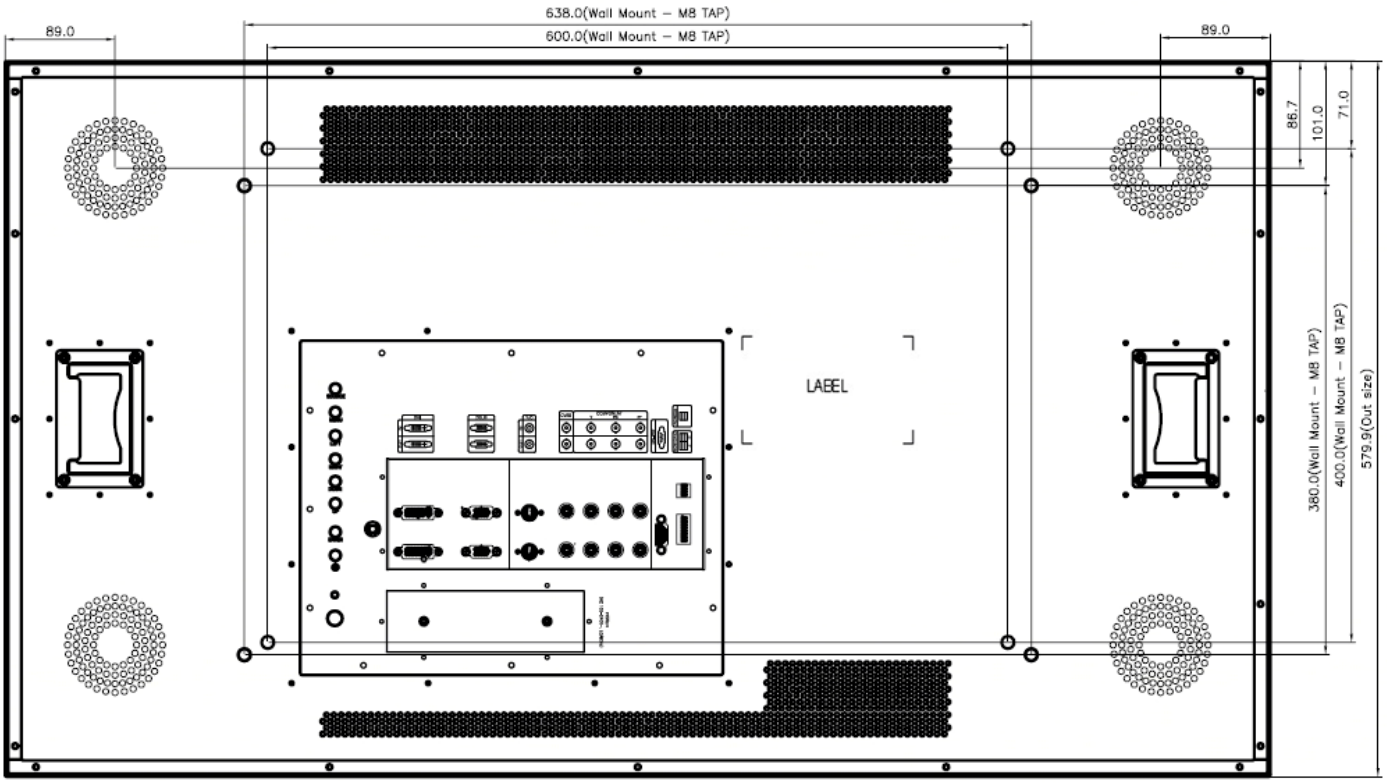
13. FIGURE

13.1. Outline Dimension





13.2. Rating Label



-. Rating label : TBD

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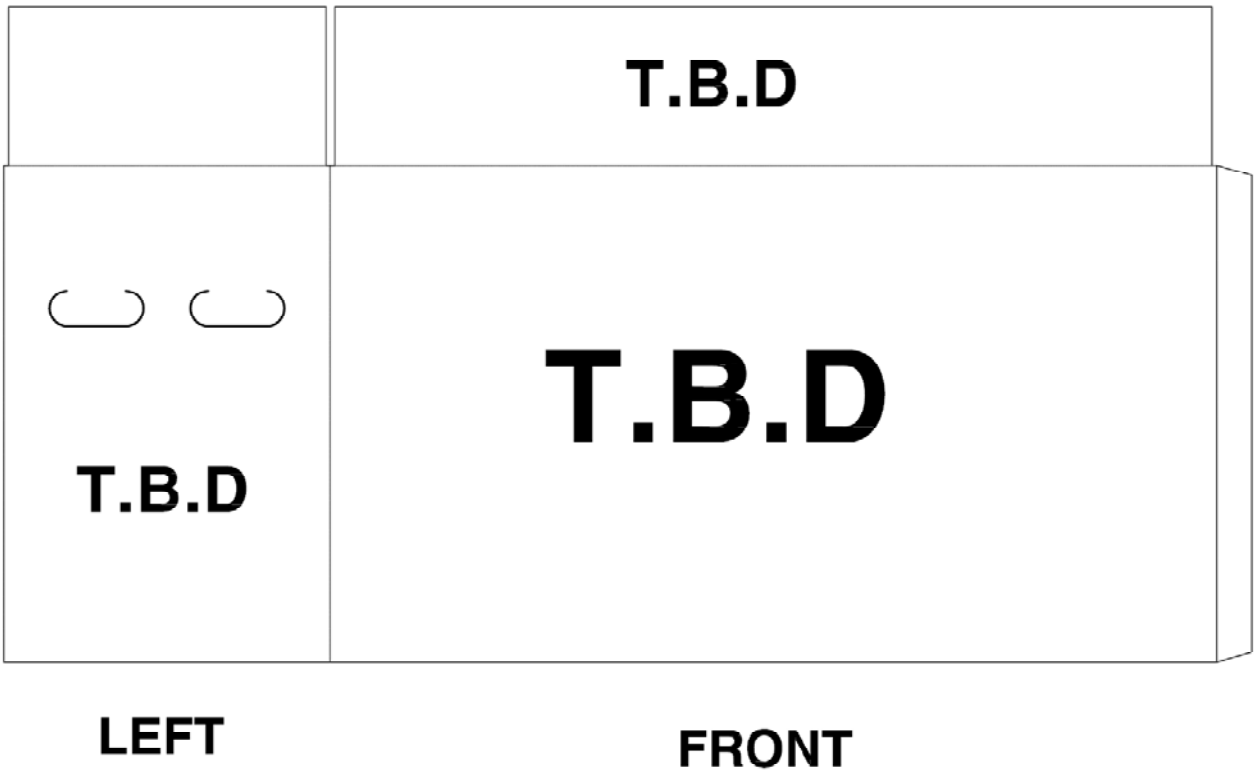
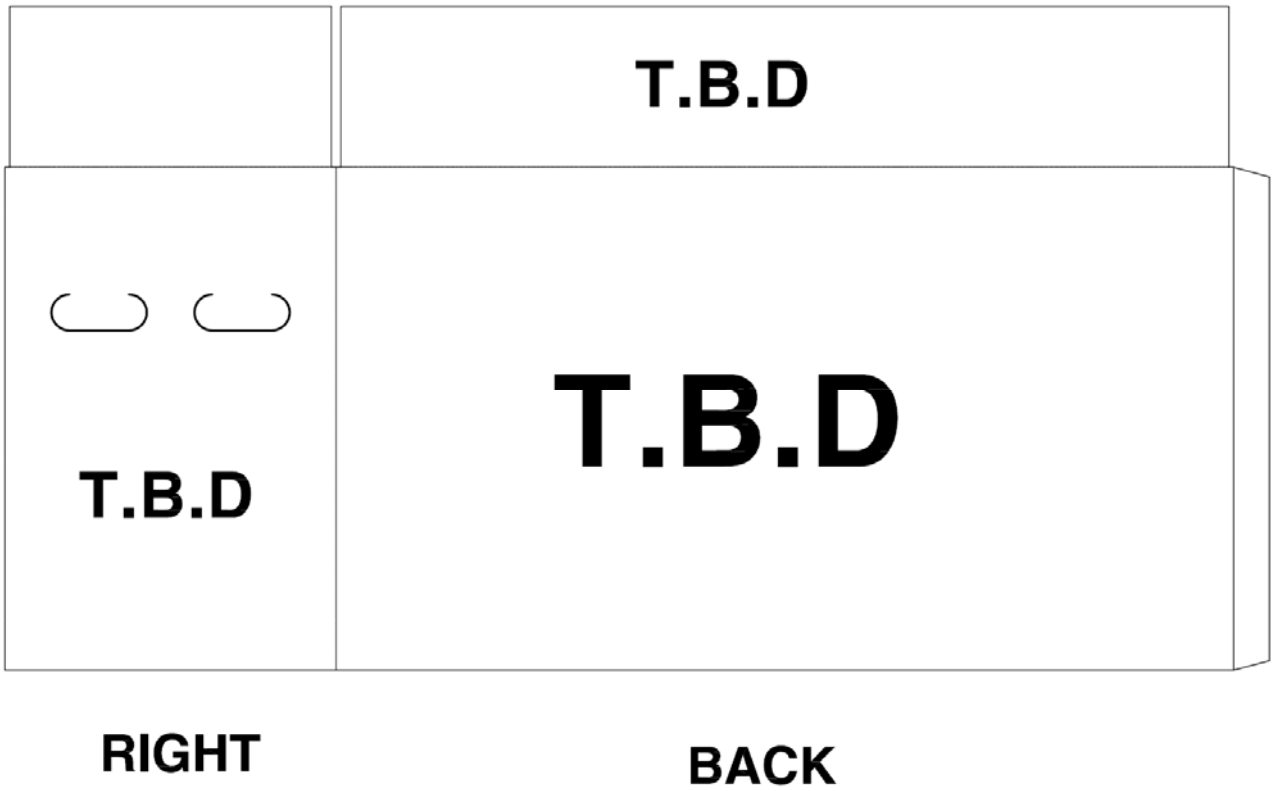
13.3. Carton box print





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